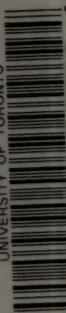


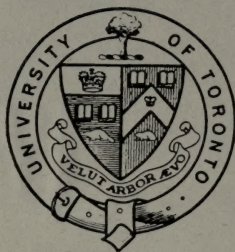
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THE NUMERAL-WORDS
THEIR ORIGIN, MEANING,
HISTORY AND LESSON

MELIUS DE VILLIERS

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THE
NUMERAL-WORDS

*THEIR ORIGIN, MEANING,
HISTORY AND LESSON*

BY

MELIUS DE VILLIERS, M.A., LL.B.

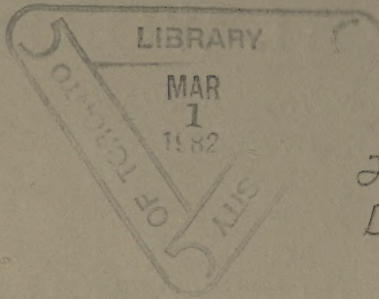
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“It is in the study of savage idioms, in the language of Bushmen and of Kafirs, of North American Indians and of Papuans, that some of the most precious facts of linguistic science have been obtained.”—PROFESSOR A. H. SAYCE,
“Introduction to the Science of Language.”

PREFACE

THE writer of these pages ventures in them to make an attempt at removing some of the obscurity in which the origin of the words denoting numbers in the English and other Indo-Germanic languages has to a great extent hitherto been hidden. So far as he is aware, there exists at the present time no sufficient and generally accepted explanation of the origin of the names for numbers in those languages. He hopes at all events that he may have invested with some degree of interest the problems which he discusses, and will succeed in stimulating further research upon the lines which he has followed, and also that what he has written on the subject may be regarded as a contribution, however slight, to the history of human progress.

This little treatise was, as regards its essential features, practically completed several years back. The writer has since discovered from a perusal of Pott's *Die Quinare und Vigesimaler Zählmethode* that his own conclusions as regards the origin of the numeral-words denoting 9 and 10 are, in the main, identical with those of Lepsius, there being however, material points of difference in details. It would seem to be owing to these points of difference that, in the first place, the views expressed by

Lepsius on this matter did not, it would appear, meet with universal acceptance, and that, in the second place, Lepsius himself failed to see that, if the origin of these two numeral-words was to be accounted for in the manner which he had suggested, the question as to the origin of every numeral-word, excepting that of the first three and of 6, and in the Germanic languages also of 11 and 12, was practically answered.

If the problem of the origin of the numeral-words be correctly solved in this little book, we shall have advanced a step farther in establishing a proof of the barbarous condition of primitive man and shall probably also be assisted in the solution of various questions relating to the dispersion of the Indo-Germanic races.

M. DE V.

By mistake an f was printed for a Greek digamma in the words "ennefa" and "ennefen" on pp. 66 and 89.

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CHAPTER I

INTRODUCTORY

¶1. PHILOLOGY has been described as designating that branch of knowledge which deals with human speech and with all that speech discloses as to the nature and history of man. Speech itself is employed to express all possible concepts, but the concept with the expression of which we specially purpose to deal in this little treatise is number, and we shall endeavour to investigate what, with regard to the nature and history of man, the numeral-words have to tell. But it must be admitted that a merely philological treatment of this subject, without the further aid of other means of enquiry, has so far not thrown very much light upon it. We should therefore, whenever it is possible, avail ourselves of such other means of enquiry as we may find to hand.

¶2. The enquiry into the origin of the numeral-words appears to the present writer to have hitherto generally proceeded upon too purely philological lines without sufficient consideration being given to the facts which have been established as to the manner in which in a state of nature man proceeds to form such words. Whilst everyone must acknowledge the excellent services which have been rendered to science through the researches of modern philologists, yet it may be remarked that the philological laws discovered by them cannot, like the formulæ of chemical or mathematical science, be held to be invariably constant; they must needs be

subject to variations and anomalies, since in dealing with any language one has, until it becomes extinct, to deal with ever-living and ever-changing matter. By not being acquainted with the facts obtained by those who have made a study of the origin of the numeral-words in native languages, or by ignoring those facts as not entirely conforming to their hypotheses, and by relying merely upon these hypotheses by themselves, it has happened that support has been given by some of the philologists to the most unlikely and far-fetched derivations of numeral-words, even in cases where the proper derivations appear quite simple to those who have practically observed the manner of origin of such numeral-words in native languages when that origin is known. For instance, whilst those who have so observed the origin of the numeral-words would, as a matter of course (for reasons which will hereinafter appear), seek for an equivalent of the word expressing 2 in the Greek *déka* (10), a philologist of renown like Brugmann approves of the suggestion that this numeral-word may be connected with *dékomai* (a dialectical form of *déchomai*), "to receive."¹ So also he is inclined to connect *deúteros*, "second," with the verb *deúomai* ("to lack"), instead of connecting it, as it naturally ought to be connected, with *duo* (2).² These derivations of his in any case are far from probable. Again, there have been suggestions on the part of philologists that the Latin *novem* (9) is connected with *novum* (new), since *octo* (8) is a dual form which may be supposed to show that at some early period counting was carried on by tetrads and that 9 formed the first number of a new series

¹ *Grundriss der Grammatik der Indo-Germanischen Sprachen*, 1st Ed., Vol. ii, p. 453.

² A. F. Pott, *Die Quinare und Vigesimale Zählmethode* (Halle; Schwetcke u. Sohn, 1847), p. 213; Miss L. M. Bagge, "The Early Numerals" in *The Classical Review* for June, 1906, p. 264.

of four.³ But it does not seem probable that our primitive forefathers would have carried on their counting with sets of four; so that there appears to be but little likelihood of such a connection, which, in fact, would in any case only exist in respect of the Latin numeral-word. It has also in the same way been suggested that the dual form *octo* itself may be connected with *acer* ("sharp") and *ocris* ("rugged mountain")⁴ with reference to the sharp ends of the two hands without the thumbs; but the idea of such a connection can hardly be seriously entertained. The Latin *quinque* (5) has been suggested to be a reduplicated form; but then there has been no suggestion as to what could possibly have been the meaning of the word of which it was a reduplication.⁵ A lady philologist has sought to connect the numeral-word for 6 with a Sanskrit root *sah*, "to be great" or "powerful"; that for 7 with *sap*, "to be united; joined to"; that for 8 with *aç*, "to attain"; that for 9 with *nu*, "now," in the sense of "near to"; and that for 10 with *çam*, "to stop, end."⁶ Such guesses at truth may be praiseworthy but can hardly be accepted as legitimate solutions of problems relating to the numeral-words. As the matter now stands, on no principles of philology does it appear to have been yet explained why, for instance, Anglo-Saxon *seofan* (7) should be represented in Latin by *septem* with a dental,

³ Walde, *Lateinisches Etymologisches Wörterbuch* (Heidelberg 1910), 2nd Ed., s.v. "Novem."

⁴ *Id.*, s.v. "Octo."

⁵ Sayce, *Introduction to the Science of Language*, Vol. i, pp. 158, 216.

⁶ Miss Caroline T. Stewart in Bezzenger's *Beiträge zur Kunde der Indo-Germanischen Sprachen* (Göttingen 1906), xxx, p. 331. Professor Sayce (*Comparative Philology*, 2nd Ed., pp. 33 and 109) says the name for 7 is probably derived from a root *sap*, "following," and that the name for 5 has been connected with *pashchât*, "behind."

nor why *novem* (9) in the latter language should in Anglo-Saxon have the form *nigan*, contrary to the usual analogies of these languages.

¶3. In this matter it is safe to say that the methods of uncivilised races in carrying on their systems of counting are more likely to afford us very great assistance and much guidance in those cases where the formation of their numeral-words can be traced.⁷ For there clearly is no reason why the origin of the Indo-Germanic numeral-words should have been different in nature from the origin of the words denoting the same numbers in the languages of such races in the case of which such origin is known to us; in fact, the likelihood must necessarily be that it would not have been different. And even the folk-lore of uncivilised races, so far as it is connected with the fingers, on which their counting operations are performed, may be of service to us in this matter.

¶4. Then again some internal evidence of the way in which the words signifying numbers in the Indo-Germanic tongues originated must surely be furnished by a comparison, as regards structure, of the numeral-words with each other. Thus, clues to the formation of several of them must evidently be afforded by the fact that the word expressing the numeral 7 has, as a rule, the same initial letter as the word expressing the numeral 6 and, moreover, the same termination as the word expressing the numeral 10; the fact that the same termination is also found in the word expressing the numeral 9 and besides, in Sanskrit at least, in a form of the

⁷ It was only since the foregoing was written that the present writer's attention was drawn to the article entitled "The Early Numerals" in *The Classical Review* for June, 1906, by Miss L. M. Bagge, who puts forward the same idea but stops short of showing its practical application. Miss Stewart (cited above) also refers to the same subject.

word expressing the numeral 8; the fact that the word expressing 8 in the classical and some other languages appears as a word of the dual number; and the fact that the word expressing the numeral 4, as a rule, either begins with the same letter as the second syllable of the word denoting 5 does, in cases where the latter word is dissyllabic, or with the same letter or a modified form of the same letter as that with which the word representing 5 ends in those cases where by mutilation of the second syllable the last mentioned word has become monosyllabic. These facts cannot be entirely accidental, nor are striking resemblances between different numeral-words in any one language always likely to be due merely to analogy or to imitation.

¶5. There is a peculiar mystery about the manner in which the numeral-words denoting 70, 80 and 90 are formed in many of the Indo-Germanic languages as contrasted with the formation of the words denoting the lower multiples of 10. To some extent there is also a peculiarity in Latin in respect of the numeral-words for 17, 18 and 19 as compared with those from 10 to 16. Then again there is the strange use of the numeral-word denoting 600 in Latin to express the idea of "a great many," as if at some early time there had been no conception yet of the numbers consisting of 100 multiplied by 7, 8 and 9. The explanation of these facts and of those mentioned in the last preceding paragraph which is given in this little treatise makes them intelligible; on no other theory do they appear to be altogether explicable. This explanation again is exactly in accordance with those conclusions which may be deduced from the facts known to us with regard to the origin of the words which are used by barbarous races to denote the numerals.

¶6. Some words of caution must be added for the benefit of the general reader who peruses the follow-

ing pages. The meanings hereinafter given to the numeral-words are, except in so far as specific authority is given for them, to be attributed to the present writer, and then only as matter of suggestion and great probability but not of certain knowledge. Except in so far as there exists such authority, and except also in so far as reference has already been made to certain meanings given to some of the numeral-words, the first ten numerals are to philologists apparently meaningless. It is endeavoured in this booklet to elicit, as far as possible, the definite meanings of all the numeral-words.

CHAPTER II

THE NUMERAL-WORDS IN ENGLISH AND IN KINDRED LANGUAGES

¶7. By a comparison of the words in use in various languages, inclusive of the numeral-words, a classification of all the known existing and dead languages of the world has been formed. They may for our present purpose be said to be, on the one hand, English and those languages to which English is allied, such as Frisian, German, Latin, Greek and Sanskrit and, on the other hand, those to which English is not allied, such as Hebrew. The former collection of languages is commonly gathered under one name as the Indo-Germanic languages and comprise the following groups: the Teutonic, the Celtic (Welsh, Gaelic, etc.), the Italic (Latin, Umbrian, Oscan, etc.), the Hellenic, the Letto-Sclavonic (Lithuanian, Lettish, Russian, etc.), the Indo-Iranian (Sanskrit, Zend, Romany or the language of the Gipsies) and the less known Thracio-Illyrian groups.

¶8. The Teutonic or Germanic comprises (1) the High German, now represented by modern German, (2) the Low German, which includes Gothic, Anglo-Saxon (the parent of English), Old Saxon, Platt-Deutsch, Frisian, Dutch and Flemish, and (3) the Scandinavian languages. When we compare the languages of this group together we find that in these languages words of evidently the same origin and generally bearing the same meaning differ from

each other in a very regular manner. For instance, the English word "two" is in German *zwei* and "twelve" is *zwölf*; thus in the case of these words the letter *t* in the one language is represented by the letter *z* in the other. So the English words "three," "thirty," "thick," "thin," "thumb" are in Dutch respectively *drie*, *dertig*, *dik*, *dun*, *duim*; the English *th* in these words is thus represented by *d* in Dutch. In German it is as a rule represented either by *t* or *d*. So also certain vowels in the one language are, as a rule, represented by certain other vowels in the other. For instance, the English words "house," "louse," "mouse," "thousand" are respectively in Dutch *huis*, *luis*, *muis*, *duizend*, and in German *haus*, *laus*, *maus*, *tausend*.

¶9. Amongst the various Indo-Germanic languages, of which the Teutonic languages form one group, there exists also a fairly regular interchange of the sounds which we represent by letters. The following table exhibits this interchange of letters as far as it is necessary to show the correspondence with each other of the various numeral-words in some of the several groups of languages :

| English | Dutch | German | Gothic | Welsh | Latin | Greek | Lithuanian | Sanskrit | Hungarian Gipsy |
|---------|-------|--------|--------|--------|-------|-------|------------|----------|-----------------|
| t | t | z (ss) | t | d | d (l) | d | d | d | d |
| th, d | d | d (t) | th | t | t | t | t | t | t |
| f | v | f (v) | f, b | p | p | p | p | p | p |
| s | z | s | s | s (ch) | s | h, s | s | s | s |
| h | h | h | h | c | c | k | sz | s | sz (s) |
| g | g | g | g | g | h | ch | ž | h | h |

¶10. With this table as a guide it will be observed how closely, as a general rule, the words denoting the same number resemble each other in the lists of such words as these appear in the various Indo-Germanic languages, such lists being given at the end of this paragraph. In a few cases the resemblance is not very obvious at first sight; for instance in the case of the Latin *quatuor* and the English "four." But if we remember that the guttural sound found in the Latin *q* and represented in that language by *c* is modified in Gothic as *h*, which again readily disappears before the semi-vowel, we arrive at a form in the latter language not so very different in sound from the Gothic *fidwor*, to which is akin the Anglo-Saxon *feower*, which in English became "four." Similarly by modifying or dropping the gutturals in the Latin *quinque* we come very near to the German *fünf*, Gothic *fimf*, to which is allied the English "five."

| | ENGLISH. | DUTCH. | GERMAN. | GOthic. |
|------|-----------|-----------|------------|-----------------|
| 1 | One | Een | Ein | Ains, aina, ain |
| 2 | Two | Twée | Zwei | Twai, twôs, twa |
| 3 | Three | Drie | Drei | Threis, thrija |
| 4 | Four | Vier | Vier | Fidwôr |
| 5 | Five | Vijf | Fünf | Fimf |
| 6 | Six | Zes | Sechs | Saihs |
| 7 | Seven | Zeven | Sieben | Sibun |
| 8 | Eight | Acht | Acht | Ahtau |
| 9 | Nine | Negen | Neun | Niun |
| 10 | Ten | Tien | Zehn | Taihun |
| 11 | Eleven | Elf | Elf | Ainlif |
| 12 | Twelve | Twaalf | Zwölf | Twalif |
| 13 | Thirteen | Dertien | Dreizehn | Thritaihun |
| 15 | Fifteen | Vijftien | Fünfzehn | Fimftaihun |
| 17 | Seventeen | Zeventien | Siebenzehn | Siebentaihun |
| 19 | Nineteen | Negentien | Neunzehn | Niuntaihun |
| 20 | Twenty | Twintig | Zwanzig | Twai tigjus |
| 30 | Thirty | Dertig | Dreizig | Threis tigjus |
| 70 | Seventy | Zeventig | Siebzig | Sibuntêhund |
| 100 | Hundred | Honderd | Hundert | Hund |
| 1000 | Thousand | Duizend | Tausend | Thusundi |

| | WELSH. | LATIN. | GREEK. |
|------|-------------------|-----------------|----------------|
| 1 | Un | Unus, -a, -um | Heis, mia, hen |
| 2 | Dau | Duo, duæ, duo | Duo |
| 3 | Tri | Tres, tria | Treis, tria |
| 4 | Pedwar | Quatuor | Tesseræ, -ra |
| 5 | Pump | Quinque | Pente |
| 6 | Chwech | Sex | Hex |
| 7 | Saith | Septem | Heptá |
| 8 | Wyth | Octo | Octo |
| 9 | Naw | Novem | Ennea |
| 10 | Deg | Decem | Deka |
| 11 | Un ar ddeg | Undecim | Hendeka |
| 12 | Dau ar ddeg | Duodecim | Dōdeka |
| 13 | Tri ar ddeg | Tredecim | Triskaideka |
| 15 | Pymtheg | Quindecim | Pentekaideka |
| 17 | Dau ar bymtheg | Decim et septem | Heptakaideka |
| 19 | Pedwar ar bymtheg | Undeviginti | Enneakaideka |
| 20 | Ugain | Viginti | Eikosi |
| 30 | Deg ar ugain | Triginta | Triakonta |
| 70 | Deg ar thrigain | Septuaginta | Hebdomēkonta |
| 100 | Cant | Centum | Hekaton |
| 1000 | Mil | Mille | Chilioi |

| | LITHUANIAN. | SANSKRIT. | HUNGARIAN GIPSY. |
|------|---------------------|--------------------------------|--------------------------------------|
| 1 | Wienas, f. -na | Eka | Jek |
| 2 | Du, f. du | Dvi, dvau | Duj |
| 3 | Trys, f. trys | Tri, trayas | Trin |
| 4 | Keturi, f. -ios | catur, catvaras, // catvari | Sztar |
| 5 | Penki, f. -ios | Pañca | Panć |
| 6 | Szessi, f. -ios | Ṣaṭ (root Ṣaṣ) | Szov |
| 7 | Septyni, f. -ios | Sapta | Efta |
| 8 | Asštuni, f. -ios | Aṣṭau | Ochto (ofta) |
| 9 | Dewyni, f. -ios | Nava | Eña |
| 10 | Deszimt | Daça | Desz |
| 11 | Wienolika | Ekâdaça | Deszu jek |
| 12 | Dwylika | Dvâdaça | Deszu duj |
| 13 | Trylika | Triyodaça | Deszu trin |
| 15 | Penkiolika | | Deszu panć |
| 17 | Septinolika | | Deszu efta |
| 19 | Dewinolika | Unaviṃçati | Deszu eña |
| 20 | Dwideszimti | Viṃçati | Bisz |
| 30 | Trysdeszintis | Triṃçat | Trenda |
| 70 | Septynios deszintis | Saptati | Eftavordez |
| 100 | Szintas | Çata | Ksel ⁸ |
| 1000 | Tūkstantis | Śahasra | Ekhezeros(desz- varszel; t'isico) |

* Seemingly for *ehsel* or *jeksel*. Compare *ek-hezeros* for 1000.

¶II. The original home of the parent stock of the races speaking the Indo-Germanic languages is a matter which has been much discussed but not yet settled; from indications derived from etymologically connected words in the various languages or dialects falling under the groups already mentioned some have thought it must have been in some part of Europe; others that it must have been in some part of Asia. Attempts have been made to deduce from similar indications the degree of civilisation to which the parent stock had attained before it separated into various off-shoots; for when a word is common to several languages it may, as a general rule, be assumed that the thing denoted by that word must then already have been in use with the people who spoke the tongue which was the common parent of those languages. It cannot, however, always be inferred, where the same thing is expressed by different words in the several languages, that such thing was not yet then in use; for words may have fallen out of use and others have taken their place. Thus, men must always have had hands as well as feet; but whilst the word for "foot" is found to be etymologically the same in a great many of the Indo-Germanic languages, the word "hand," standing by itself, occurs only in the Teutonic languages; although, as we shall hereinafter endeavour to show, it still appears as a component part of most of the numeral-words in all the Indo-Germanic languages. The people of the original stock at the time of the separation evidently had houses, probably of wood, and even township communities and other settled institutions. They possessed cattle, horses, swine and other domesticated animals, and had folds, stables, sties and similar shelters for these. They cooked their food, and for that purpose used grain among other things; they were thus acquainted with agriculture. Besides water they had as drinks milk and mead. They crossed the water on boats, which they had skill enough to construct. They had,

amongst other arms, bows, arrows and axes, and were acquainted with the use of several metals. They are held to have worshipped the bright sky and are believed to have conceived the moon and stars to be daughters of the same. They observed the phenomena of nature, but they had not as yet the division of the year into twelve months; in fact we know that it was only within historical times that the Romans abandoned the year of ten months in favour of the year of twelve months, and according to Herodotus the Greeks were unacquainted with such division till a knowledge thereof was acquired by them from the Egyptians. They were perhaps able to count as high as a hundred, possibly as high as a thousand; this is a matter which later on in this treatise will again be referred to. On the whole it would seem that the race was then advanced considerably beyond the stage of mere barbarism, whatever its original condition may have been.

¶12. Among the people of the Indo-Germanic stock different dialects or forms of the common language developed themselves as separate communities came to be formed, the members of which lived in close communication with each other and in less close communication with the members of the other communities, and gradually acquired a manner of speech peculiar to themselves. These communities at various times and from various causes became detached from each other, and in their subsequent wanderings spread themselves over a large portion of Europe and of Asia. The community employing the Teutonic manner of speech in course of time occupied the greater part of what till lately was the German Empire and some other countries besides, but their language had by this time become very distinctly different from the language of any of the other communities, though fundamentally all these languages remained the same. In the fifth and sixth centuries of the Christian era emigrants of the

Teutonic branch of the Indo-Germanic stock, who had been living on the eastern shores of the North Sea, established themselves in Britain and to a great extent dispossessed a people of Celtic race, who belonged to another branch of the Indo-Germanic stock. These immigrants were mostly Angles and Saxons, two different tribes but speaking substantially the same language. In later times the term "Anglo-Saxon" was commonly used to describe the language which was then introduced into England. These tribes, of course, brought over with them the numeral-words which they had been accustomed to use in their own country. It is unnecessary to give a detailed account of these; the first and fundamental ten of these were as follows: *ân, twa, thri, feower, fif, six, seofan, eahta, nigan* and *tên*. The modern English numeral-words are the Anglo-Saxon ones which have become somewhat modified in the course of the development of the language. The changes thus effected in these words perhaps call for no special remark, except that the first numeral-word *ân* became in some parts of England before the beginning of the thirteenth century *ôn*, and later on in the course of a few centuries developed that initial *w*-sound which it has in what is considered to be the proper pronunciation at the present day. On the other hand "two" has lost its *w*-sound and is pronounced as "too."

¶13. In discussing hereafter the origin and meaning of the English numeral-words it will be necessary to discuss along with them the corresponding numeral-words in the kindred Indo-Germanic languages, since it often happens that the form in use in one or other of these latter languages throws much light upon those which are employed in English.

CHAPTER III

THE PERSISTENCE OF FORM OF NUMERAL-WORDS

¶ 14. PROBABLY no words in language withstand the ravages of time better than those denoting number. Their original meanings may become lost to the speakers of a language very early in the history of a race, and where the forms of such words have once become fixed and the words themselves have become meaningless to the people speaking them, they are likely to be preserved in unchanged or very little changed forms, so long as that people retains its original speech and thus no special cause exists occasioning a departure from these forms. It is owing to this persistence of form of the numeral-words, when once their form has been fixed, that, making allowance for the changes which the sounds expressed by letters undergo in the various languages spoken by different peoples in accordance with rules which normally come into operation, the numeral-word afford very excellent means for studying such relationships as may exist between these various languages and that, by the study and comparison of these languages between which a relationship exists, we may hope to be able to recover the original forms and discover the original meanings of such words in these languages. And, owing to their survival and persistence of form, the numeral-words are often, even under adverse circumstances, of great practical advantage in throwing light upon the history of a people. This may be illustrated by a few examples, to find which one need not go beyond the limits of Great Britain.

¶15. A people may have lost its primitive language by the adoption of another in general, and yet retain the numeral-words of their original language; but in that case the coming into use of a new language will naturally occasion a corrupt departure from the original forms of these words. It may not be generally known that in parts of Lincolnshire and of some other counties in England old shepherds at the present day still count their sheep with numeral-words of Celtic origin, as also do old women their stitches in knitting, though a somewhat corrupt departure from original forms and a tendency to the forming of rhymes (probably as an aid to memory) have helped to cause a considerable alteration in the forms of such words. The resemblance between the Lincolnshire method of counting and the Welsh numeral-words are apparent from the following table:

| | LINCOLNSHIRE. | WELSH. |
|----|----------------|-------------------|
| 1 | Yan | Un |
| 2 | Tan | Dau |
| 3 | Tethera | Tri |
| 4 | Pethera | Pedwar |
| 5 | Pimp | Pump |
| 6 | Sethera | Chwech |
| 7 | Lethera | Saith |
| 8 | Ilovera | Wyth |
| 9 | Covera | Naw |
| 10 | Dik | Deg |
| 11 | Yan a dik | Un ar ddeg |
| 12 | Tan a dik | Dau ar ddeg |
| 13 | Tethera dik | Tri ar ddeg |
| 14 | Pethera dik | Pedwar ar ddeg |
| 15 | Bumpit | Pymtheg |
| 16 | Yan a bumpit | Un ar bymtheg |
| 17 | Tan a bumpit | Dau ar bymtheg |
| 18 | Tethera bumpit | Tri ar bymtheg |
| 19 | Pethera bumpit | Pedwar ar bymtheg |
| 20 | Figgit | Ugain |

Variant other forms of these numeral-words thus employed are to be met with; for instance, the following:

Een, teen, tetherem, metherem, mix;
 Sethera, lathera, obero, dobero, dix;
 Eendix, teendix, tetheremdix, metheremdix, bumpit;
 Eenbumpit, teenbumpit, tetherembumpit, metherem-
 bumpit, dixit.

¶16. In some of the counting-out rhymes, too, made use of by children in Scotland some of these Celtic forms have been preserved which may be compared by the reader with the foregoing. Thus, one in use in some parts of that country is as follows:

Seentie, teentie,
 Tennera, mennera,
 Bamf, thera, ledra,
 Hover, dover,
Saw the King o' Hazle-Pazle
Jumpin' owre Jerusalem dykes
Playin' on his wee pee pipes.

Omitting the words appearing in italics, which are mere padding, we here find corrupt forms of the first ten numeral-words of the Welsh language. If these words in italics bear any special meaning it may be left to some future investigator to discover what it is. In Aberdeenshire, too, one meets with doggerel rhymes beginning with the lines:

Eetern, feetern, penny pump,
 All the laddies in a lump

where the words "penny pump," however English they may appear to be, are but the Celtic words *pethera*, *pimp*, respectively denoting 4 and 5, and the words "eetern, feetern" are still more corrupt forms than "een, teen, tetherem" of the first three Welsh numeral-words. When spoken by a people to whom a language is unknown, that language may become

so corrupt that it is not quite impossible that the first fifteen Celtic numeral-words may lurk in such counting-out doggerel as the following, which is to be met with in several parts of England:

Onery, airey, ickley, am,
 Phillisey, phallesey, Nicholas, jam,
 Quobey, quabey, English, navy,
 Stinkerem, stankerem, bunk.

In these not very melodious lines the first word seems to show that we have to do with a series of numeral-words; whilst the last or fifteenth word has a distinct resemblance to *bumpit* (15); the thirteenth and fourteenth, "stinkerem, stankerem" appear to be suggested by *tetherem(dix)* and *methere(m)dix* and possibly "quobey, quabey" by *obera, dobera*. It is perhaps natural that these lines should end with the numeral 15, as the four numerals following thereafter in Celtic are the equivalents of "one and fifteen," "two and fifteen," "three and fifteen," and "four and fifteen," and thus somewhat confusing. The initial or other portions of these lines have, with the aid of alliteration and rhyme, been transformed into others, generally followed by meaningless doggerel. In connection with these corrupted forms of the Celtic numeral-words it may here be incidentally mentioned, as showing the connection between Lincolnshire and Welsh, that in that county the name given to the bittern is "bumpycross," which is a corruption of the Welsh name *bump-y-gross*, meaning the "booming of the marsh."

¶17. The facts mentioned in the last preceding paragraph point to a dispersion of the Celtic or Brythonic race in former times over a much wider area of country than it now occupies, and show that the people inhabiting Great Britain is of the same extraction as the Welsh to a much greater extent than was at one time generally supposed. The Celts were not entirely exterminated in the parts of Britain

outside of Wales by conquerors of Germanic race, but to a large extent remained in those parts of the country, though conquered and probably reduced to lowly service, and were then absorbed in the general population. In these facts then we find some support for Huxley's contention that there is not the slightest justification for the common practice of speaking of the present inhabitants of England as an "Anglo-Saxon" people.

¶18. The French numeral-words from 1 to 10, much altered by mispronunciation by people to whom French was a foreign tongue and through the tendency to alliteration and the forming of rhymes, are apparently to be found in the first two lines of the following counting-out jingle, which, with manifold variations, is to be heard in common use by children all over England:

Una, duna, des,
 Catlo, wuna, wahna, wes,
 Each, peach, muskydom,
 Tillatah, twenty-one.

These doggerel lines may be surmised to have originally run thus:

Un(e), deux, trois,
 Quatre-cinq, six-sept, huit-neuf, dix;
 Each speech must be dumb
 Till I tell twenty-one.

It may be noticed that the ten numerals here supposed to be comprised in the first two lines and the eleven syllables of the last two lines together make up twenty-one in the counting-out process. *Une* may in French originally have been pronounced as a disyllable; for the sake of the rhyme and the rhythm *deux* may have been transformed into *deux-ne* (to complete the metre this, in the corrupt form *duna* is generally repeated); whilst *des* may stand for *dix*

and *wes* for (*tr*)*ois*, these two numeral-words being transposed for the sake of the consequent alliteration. *Catlo* is pretty near to an original *quatre-cinq* and *wahna* to *huit-neuf*; whilst *wuna* is substituted for *six-sept*, also by way of rhyme and alliteration. The suggested verb "tell" may have been used in its older meaning of "count," as in the case of the Dutch *tellen*; hence the word "teller" in parliamentary usage in the sense of a counter of votes. Possibly these lines may date from the days of the Norman supremacy in England, which even in the thirteenth century was to a great extent still bilingual. At the time of Chaucer, at the end of the next century, the numeral-words of French origin *deuce* (2), *trey* (3), *sink* (5), and *sise* (6) were still in common use in the game of hazard. At the present day the counting-out rhyme here referred to may also be heard in common use amongst Dutch-speaking children in South Africa and amongst Parsi children in India, testifying to the historical fact of the past occupation of both South Africa and India by an English-speaking race from which this rhyme has been acquired and which at some time in its history had been under French influence. These lines underwent—presumably in the United States of America—a further corruption into:

Eena, deena, diua, do,
 Catch a nigger by the toe;
 If he hollers let him go;
 Eena, deena, dina, do

of which only the portion here not printed in italics has a connection with the original words. The first and last lines are occasionally further alliteratively modified into

Eena, meena, mina, mo.

Here still then we have the relics of some of the numeral-words, much impaired by adverse circum-

stances. And it is possible that some other counting-out rhymes are still further corruptions of these corrupted forms.

¶19. The Gipsies, who are found not only in England but also dispersed throughout many parts of Europe and parts of Asia, were so called on the supposition that, as they themselves gave out on their arrival in England, they had come from a country which they called "Little Egypt." They are not, however, in any way of Egyptian but are of Asiatic origin, and they belong to an Indo-Germanic race. This is quite evident from their speech, and particularly from the numeral-words which they make use of when they do not speak the language of the country in which they are living. A striking resemblance, for instance, will be found upon examination to exist between the numeral-words in use with the Kurds (who also are of Indo-Germanic origin) and those of the Gipsies. The English Gipsies have special numeral-words for the numbers from 1 to 5 and for 10 and 20, but they appear, with few exceptions, now to have lost the knowledge of the numeral-words expressing 7, 8 and 9. This fact is probably due to their intercourse with an English-speaking people. When they wish to express these last mentioned numerals in their own language, they have recourse to cumbrous methods, saying for 7 *dui trins ta yek*, "two threes and one," for 8 *dui stors*, "two fours," and for 9 *dej sore but yek*, "ten all but one."⁹ This almost looks like a case of atavism—a going back to prehistoric forms. It is alleged that within the last fifty years or thereabouts there still were Gipsies in England who could count in their own language up to 100. For the sake of comparison lists of the numeral-words known to the English Gipsies are here given in the Kurdish

⁹ George Borrow, *Romano Lavo-Lil; Wordbook of the Romany Language*, p. 9.

language, in the speech of the Hungarian Gipsies and in the English Gipsy or Romany language respectively:

| | KURDISH. | HUNGARIAN GIPSY. | ROMANY. |
|----|----------|---------------------|----------------------|
| 1 | Jek | Jek | Jek (pronounced yek) |
| 2 | Du | Duj | Dui |
| 3 | Seh | Trin | Trin |
| 4 | Ceahr | Sztar | Stor |
| 5 | Pené | Pané | Panj |
| 6 | Scesc | Szov | Sho |
| 7 | Aft | Efta | Dui trins ta jek |
| 8 | Asht | Ochto | Dui stors |
| 9 | Nah | Eña | Dej stor but jek |
| 10 | Dah | Dej | Dej |
| 20 | Bist | Bisz | Bis |

¶20. There are thus cases, and there may be others than those already referred to, where the study of the numeral-words as they have persisted for ages in the usage of the people or in the simple rhymes of children at their games, either serves to correct erroneous impressions as to the past history of a country or would preserve for us the knowledge of certain facts in that history, even though no other sources of information were in existence. The history of the numeral-words is to some extent the history of the people who use them, and in this respect at least the study of these words may prove to be of practical service in various ways.

¶21. There may be cases where not a whole system of numeral-words belonging to one language is in permanent or occasional use amongst a people speaking a different language, but where only one or two words of this nature are in such use, and where we are led to the conclusion that at some time or other there had existed a point of contact between the two races respectively speaking these languages.

Thus the Bechuana of South Africa at the present day instead of using their own cumbrous expression for 1,000 have very generally adopted the English word denoting that number in the form *thausanta*. When at some distant period of time the Bechuana language (Sechuana) comes to be matter of study, then, even in the absence of other sources of information it might be gathered from that fact alone that at some time in the past there had existed a point of contact between the English and the Bechuana races, such as in fact there now exists. Of course, from the fact of there being a certain similarity between numeral-words in two different languages one may not always infer that they ever stood in any sort of etymological relation to each other. We find in Hebrew the forms *shesh* for 6 and *shebâ* for 7, which closely resemble the corresponding Aryan (or Indo-Germanic) numeral-words, but there are philological reasons for believing that this resemblance happens to be a mere coincidence; the cause of the coincidence, if it be such, being no doubt that there was a certain resemblance between the words primarily denoting 3 (of which the words denoting 6 would be reduplications) in the two languages. The Basque *sei* (6) must also be considered to be a coincidence. The numeral-word in Sechuana (the language of the Bechuana) for 1 is *ñoe* (pronounced *ngwe*), for 2 is *peli* (pronounced by some as *peri*, by others as *pedi*), for 3 is *tharo* (*th* as in "boat-house"), and for 7 is *shupa*; the fact these numeral-words respectively bear a certain resemblance to Latin *unus*, to the first two syllables in *perendie* ("the next day" or "second day") to *tres* and to *septem* does not justify us in concluding that these words are of the same or of kindred origin; though at least one writer has sought to establish a connection between the Bantu languages (to which Sechuana belongs) and the Indo-Germanic tongues.

CHAPTER IV

GESTURE-LANGUAGE; AND THE RELATION IN GENERAL OF HANDS AND FINGERS TO NUMERAL-WORDS

¶22. THE word language, though it is derived from *lingua*, "the tongue," is frequently applied to other means of communication than spoken words; hence one may without impropriety speak of "gesture-language." Even amongst civilised people spoken language is often accompanied by signs of the hand and other gestures to give more forcible expression to an utterance; and amongst some savage races gesticulation is so much a necessary adjunct to speech that it is said that they are unintelligible to each other in the dark, and that when they want to converse when daylight has ceased, they are compelled to collect round their camp-fires. The Indians of North America, it is well known, are perfect adepts at the language of signs. A traveller among the Comanches, who is cited in Lord Auebury's *Origin of Civilisation*, makes the following statement: "They have a language of signs, however, by which all Indians and traders can understand one another; and they always make these signs when communicating among themselves. The men, when conversing together in their lodges, sit upon skins, cross-legged like a Turk, and speak and make signs in corroboration of what they say with their hands, so that either a blind or a deaf man could understand them. For instance, I meet an Indian and wish to ask him if he saw six wagons drawn by horned cattle, with three

Mexican and three American teamsters and a man mounted on horse-back, I make these signs: I point 'you,' then to his eyes, meaning 'see,' and then hold up all my fingers of the right hand and the forefinger of the left, meaning 'six'; then I make two circles by bringing the ends of my thumbs and forefingers together, and holding my two hands out move my wrists in such a way as to indicate wagon-wheels revolving, meaning 'wagons'; then, by making an upward motion with each hand from both sides of my head I indicate horns, signifying 'horned cattle'; then, by first holding up three fingers and then by placing my extended right hand below my lower lip and moving it downward, stopping it midway down the chest, I indicate 'beard,' meaning 'Mexican,' and with three fingers again and passing my right hand from left to right in front of my forehead, I indicate 'white brow' or 'pale face.' I then hold up my forefinger, meaning 'one man,' and by placing the forefinger of my left hand between the fore and second finger of my right hand, representing a man astride of a horse, and by moving my hand up and down, give the notion of a horse galloping with a man on his back. I in this way ask the Indian: 'You see six wagons, horned cattle, three Mexicans, three Americans, one man on horse-back?' If he holds up his forefinger and lowers it quickly, he means 'Yes'; if, however, he moves it from side to side, upon the principle that people sometimes shake their heads from side to side, he means 'No.' "

¶23. It is not our intention, however, to discuss gesture-language in general farther; it is sufficient and it is desirable for our purpose merely to point out that the fingers of the hand would always have been essentially helpful to men who had attained to only a rudimentary form of spoken language as an aid to the expression of ideas. They would also have been particularly useful—especially those of the

right hand—in indicating persons and things by these being pointed at, where we now would use demonstrative pronouns, and also—more especially those of the left hand, as will be shown hereinafter—in counting and in indicating numbers. The left hand with its fingers served for numeration; the right hand with at least some of its fingers served for indication. It comes natural to one to count the five lowest numerals on the fingers of the left hand, “telling” them off with the forefinger of the right hand. The term “digit” (Latin *digitus*, “a finger”), expressing an integral number under 10, reminds us of the time when counting was done on the fingers.

¶24. The hand with its fingers, besides furnishing mankind with sundry convenient measures of length, was the original counting machine of the human race; of this fact we find a trace in the Greek word for counting, *pempascin*, from a word denoting 5, Æolic *pempe* in allusion to the five fingers of each hand upon which the counting was performed. Hands and fingers must always amongst primitive peoples have been the most important factors in the origin and development of the art of numeration. “Hence, no doubt, the prevalence of the decimal system in arithmetic; it has no peculiar advantage; indeed eight or twelve would in some respects have been more convenient; eight because you can divide it by two and then again divide the result by two; and twelve because it is divisible by six, four, three and two. Ten, however, has naturally been selected because we have ten fingers.”¹⁰ Uncivilised races in fact find some difficulty in counting without their fingers. Thus a recent writer, referring to a certain member of a Bedouin tribe, says: “There is Dakûm, our photographer . . . he could count up to ten,

¹⁰ Lubbock (Lord Avebury) *The Origin of Civilisation*, Chap. viii., p. 340.

thanks to his fingers." The writer adds: "If he wanted to go beyond that, he had to take off his shoes and start on his toes." A vigesimal system of numeration is also occasionally met with, arising from the fact that human beings have ten toes besides their fingers. Traces of such a system are perhaps to be found in French in such expressions as *soixante-dix* ($60+10=70$), *quatre-vingt* ($4\times 20=80$) and *quatre-vingt-dix* ($4\times 20+10=90$), instead of *septante*, *huitante* and *nonante*, which at one time were also occasionally used. Possibly with this also may be connected the scriptural usage in accordance with which the years of a man's life are stated to be "three score and ten." Outside of the Indo-Germanic peoples however, amongst some races who were highly advanced in astronomical science, for instance the Chaldeans, a system of numeration prevailed in which the number 60 was an important element; this was probably due to the fact that the period of the movement of the sun on the horizon from solstice to solstice and back again is in round numbers some 360 days (hence the division of the circle into 360 degrees) and possibly also that the period of time from solstice to solstice is six months.

¶25. Man in his primitive condition did not urgently need, and, it would seem, did not at first have, names for any of the few numerals that lay within his mental grasp. Any of these few he would have been able to indicate by simply extending or pointing to an equivalent number of fingers of one hand, as the members of many native tribes at the present day still do, even when they have names for the numerals or at least for some of them. Even for his fingers, as for other parts of his body, he probably at first had no specific names, and in his communications with others he would not have been much inconvenienced by that fact, if it was such, since it was possible for him to indicate by gesture

any part of the body to which he wished to refer. But, as his faculty of speech gradually attained a higher degree of development and he learned to rely less and less upon the language of gesture, and when he became master of words denoting various actions, and especially of those words which denote an action for the performance of which any particular part of the body is the appropriate instrument, he would naturally also have proceeded to indicate any such part of the body by a word derived from a word of action denoting that it was the fit instrument for such action. As a simple illustration of this process we may take the word "finger," which seems simply to mean "the catcher." (Compare German *fangen*, "to catch"; *fing*, "caught"; *finger*, "finger.") In Latin *digitus* and in Greek *daktylos*, both of which words mean "finger," are by some philologists referred to a verb denoting "to point." So also in Latin *dens* (*dent-s*), Attic Greek *odous*, Ionic *odōn* (for *odouts*, which=*edouts*=*edents*; compare the Æolic Greek plural form *edontes* and also *triakonta* for *triakenta*), Dutch *tand*, Gothic *tunthus*, English (in a considerably modified form) "tooth," is the instrument with which nature has endowed us for the purpose of eating; all these forms having originally, according to the generally received derivation, been participles of a verb denoting "to eat," Latin *edere*.

¶26. In the Germanic languages a considerable number of words denoting parts of the human body (which are amongst the objects to denote which men would at a very early stage of development have felt the desirability of having recourse to spoken language) have their physical and at the same time etymological equivalents in the classical languages. Such (taking into account the laws as to the transmutation of letters referred to above in paragraph 9) are Latin *caput* (Anglo-Saxon *heafod*; Old English *hevid*), "head"; *cerebrum* (*ceresrum*), Scotch

“harns” (“brains”); *oculus*, Dutch *oog*, “eye”; *auris*, “ear”; *nasus*, “nose”; *labia*, “lip”; *gena*, “chin” (with a somewhat different meaning); *lingua* (for *dingua*), “tongue”; *dens*, “tooth”; *cor(d)*, “heart”; *cutis*, “hide”; *ulna*, “elbow”; *armus*, “shoulder-joint,” “arm”; *pugnus*, “fist”; *unguis*, *ungula*, “nail”; *coxa*, “hip”; *genu*, “knee”; *calx*, “heel”; *pes*, “foot.” Considering the co-existence of these forms denoting parts of the body from head to foot, it would not be unnatural to expect that probably a form would have existed in the earliest Latin and Greek and allied languages, or in their common progenitor, that would have been the etymological equivalent of the word “hand.” The Dutch word for “tooth” is a less corrupt form, *tand*. As to the Dutch *tand* there answered in Latin *dent*, so, corresponding to the Dutch *hand* (“hand”) one might expect (again taking into account the laws as to the transmutation of letters which has already been referred to) that there must have existed a root-form which in Latin would have taken the shape of *cent*. Another analogy suggesting the existence at one time of such a form is the first half of the Dutch word *hart* (“heart”) answering to the first half of the ancient form *cerd*, which is to be found in the Latin *credo* (*cerd+dhō*), to “set the heart,” to “trust” or “believe,” and which appears in classical Latin in the form *cor(d)*. So also we have the Latin *cervus* allied to the English “hart” and the Latin *cerebrum* allied to the Scotch “harns” (“brains”).¹¹ If one may venture to make a surmise, it seems possible that in the case of the word “hand” and its etymological equivalents we have

¹¹ The word in use in classical Latin to denote “hand” was *manus*, which also meant (which the word “hand” never did) marital or paternal power, the Germanic *mund*. Cf. Muirhead, *Historical Introduction to the Law of Rome*, 2nd Ed., pp. 24, 60. It may be suggested that both *manus* and *mund* are derived from a root signifying “to have power.”

to do (as in paragraph 25 was shown to be probable in the case of the word "tooth") with a present active participle form of the neuter gender of a verb probably denoting "to seize" or "hold."¹² It may be added that the initial letter of the word "hand" must be regarded as having originally been a guttural. Gutturals in many languages have a tendency to degenerate into an aspirate.

¶27. If we regard the manner in which the numeral-words are formed in the languages of many savage races, in cases where the manner of formation is known to us, and should find that the equivalents of the word "hand" in native languages entered into the composition of the numeral-words in those languages, it should create no surprise if the word "hand" or its equivalent form (such as in Latin a form *cent*) were found to enter into the composition of many of our numeral-words. This they seem to do, as appears, for instance, in the case of the Latin *centum* (100), *decem* (10) and *viginti* (20). And it is possible that, upon further investigation into this matter, we may arrive at the conclusion that our primitive ancestors were mere savages, whose ideas of numeration were originally as limited as those of savages at the present day.

¹² Compare "fiend," "friend" and Old English *Scyppend* (Dutch *Schepper*, "Creator") and *Heliand* (Dutch *Heiland*, "Saviour"), all originally participle forms; and see Walde's *Lateinisches Etymologisches Wörterbuch*, 2nd Ed., s.v. *com-, cum*. It may be suggested that the root-form referred to in the text is possibly found in the Latin word *recens*. The ideas of recurrence or renewal and of newness being to some extent related (for instance in the case of the changes of the moon, in respect of which the idea of newness may first have suggested itself to the savage mind), this word may reasonably be construed as having originally meant "seizing afresh," "beginning anew," hence "recent." Compare the German participle *anfangend*, "beginning" literally "catching on," from *fangen* "to catch."

¶28. It seems possible that among the Aryan or Indo-Germanic races the counting of the fingers began on the thumb of the left hand, the counting being done with the right hand, as such a practice appears to be a very usual one amongst savage peoples. We have, however, no means of asserting anything certain on this point. Among the Romans the fingers appear to have been usually mentioned in such order that the thumb came first and the little finger last. They were named or described in this order in the following manner: (1) *Pollex*, (2) *index*, *digitus saluatorius* or *digitus demonstratorius* (because with it one greeted or pointed), (3) *digitus impudicus* (the finger of scorn among the Romans), (4) *digitus annularius* or *digitus medicinalis* (the ring-finger, also used for mixing medical ointments) and (5) *digitus minimus* or *digitus auricularius* (the little finger, which is used for scratching the inside of the ear).¹³ In the folk-lore rhymes relating to the fingers among the German peoples the fingers are, as a rule, mentioned in the order given above. In Holstein, for instance, they are given thus: *Lüsche-knikker*, *pütjenlicker*, *langmeier*, *golden-ringer*, *lütjefinger* (louse-knicker, pot-licker, long husbandman, golden-ringer, little finger), but occasionally the words appear in reverse order. In Flemish one meets with *Aap*, *knaap*, *langeraap*, *vingerling*, *tiereliereling* and *Duimken*, *duimkensmaat*, *langeraap*, *pillepoot*, *pinkskén*. Here *aap* means "ape," *knaap* "lad" or "fellow," *langeraap* either "longer ape" or "long rape," *vingerling* is a diminutive of *vinger* ("finger") and *tiereliereling* seems to mean "little songster." *Duimken* is "thumbkin" and

¹³ To *pollex* (*pro-lic-s*) seems etymologically to correspond the Dutch *verlokker* ("allurer"), and with it may be compared *pellex* (*per-lic-s*, "enticer"). The idea of a person beckoning as if to say: "Come to me," may have been conveyed by the word; whilst *index* (*in-dic-s*) was that with which was pointed; more especially to the person spoken to.

duimkensmaat "thumbkin's mate"; *pillepoot* is "pill-paw" (*digitus medicinalis*) and *pinkskén* is a diminutive of *pink*, the little finger; that finger having a name of its own in Dutch and Flemish, just as the thumb has in English as well as in those languages.¹⁴ In the case of the middle finger allusion to its length is generally made in rhyming lines of this kind. In an English nursery verse the same order is observed as in the cases already referred to, but the words are not very appropriate:

This pig went to market,
 This pig stayed at home,
 This pig had a piece of bread and butter,
 This pig had none,
 This pig cried wee, wee all the way home.

¶29. Whilst the Bantu peoples of South Africa begin their counting with the little finger of the left hand and end with the thumb, the references in sayings corresponding to the European nursery rhymes sometimes take the fingers in a different order. Thus the Bavili section of the Bantu say:

1. (Middle finger) There is no man so tall as I or equal to me;
2. (Index finger) I am the one that follows;
3. (Third finger) How much do you gain by being taller or stronger?
4. (Little finger) What do you all gain by being tall; I am your Chief;
5. (Thumb) For this reason I, who am not your equal, am by myself; for this reason I have left you (i.e., on account of this constant strife).

¹⁴ *Pink* happens to have a curious resemblance to the word denoting 5 in some of the Indo-Germanic languages.

So the Katongo people taking the fingers in the same order say :

1. There is no man equal to me, or so tall as I am;
2. I come after thee;
3. And what do you gain by it, father and mother;
4. Why does he raise the question of father and mother?
5. Your one apart is your slave.¹⁵

Here, as amongst a people with whom the art of oratory is the art of boastful self-praise, prominence is given to the language of the tallest finger, the index finger being considered his companion. But evidently in the Bavili version the little finger ranks highest as coming first and thus as the Chief, with whom the thumb, which comes last, cannot claim equal rank; and, in fact, in the Katongo version the thumb is the slave. Though the fingers thus are taken in the order here given, nevertheless the relative ranking of the little finger and the thumb corresponds with the general Bantu practice of counting on the outstretched fingers of the left hand, beginning with the little finger.

¶30. The Papuans of New Guinea however, it is stated by missionaries who have laboured amongst them, count by folding the fingers into the palm of the hand, and not by holding up the fingers of one hand to be counted with the other hand. When therefore, on being asked for the names of the numerals, they hold up one finger they at the same time give the name for the numeral 4, or, when four fingers are held up they name the numeral 1, so that when the five fingers are held up there remains no numeral to be mentioned. This method of counting led Europeans at a former time to conclude that these people could count no higher than 4. These

¹⁵ W. E. Dennett, *At the Back of the Black Man's Mind* (MacMillan & Co., London, 1906), p. 43.

missionaries, however, themselves state that, owing to the cumbrous and complicated forms of the native numeral-words above the few lowest, they introduced and induced these people to adopt the Malayan numeral-words. Their statements show that great care should be exercised before in every case one arrives at the conclusion that a native people is unable to count beyond a certain number; though undoubtedly cases do very frequently occur, as will presently be shown, where a barbarous race has no numeral-words beyond those expressing a few of the lowest numbers.

CHAPTER V

THE ART OF RECKONING AMONG SAVAGES

¶31. IT has been remarked by the late Sir John Lubbock (after accepting a peerage Lord Avebury) in his book entitled *The Origin of Civilisation and the Primitive Condition of Man* that there is perhaps no more interesting part of the study of language than that which concerns the system of numeration, nor any more striking proof of the low mental condition of many savage tribes than the undoubted fact that they are unable to count their own fingers even of one hand. After giving numerous illustrations of this mental incapacity of savages in regard to arithmetical calculation and of their habit of using their fingers for counting, the learned writer concludes his remarks by saying: "These examples seem to me very instructive; we seem, as it were, to trace up the formation of the numerals; and we obtain interesting, if melancholy, evidence of the extent to which the faculty of thought lies dormant in the lower races of man."

¶32. Several writers have taken exception to the conclusions at which, on the strength of these and a large array of similar facts, the learned author of the *Origin of Civilisation* arrived, that mankind, so far as it is civilised, has risen from a state of savagery; but it may safely be said that the arguments which have been brought forward in opposition to his views hardly seem to require serious refutation. Some of the numerous facts advanced by that writer

and by others, tending to show the mental incapacity to which allusion has already been made may be recounted here.

¶33. The Jungle Veddas of Ceylon, it is asserted, have no numeral-words at all in their language, and would therefore be unable, articulately at least, to count.¹⁶ The Botocudos, a South American tribe, have no definite number above 2; with them whatever is above 2 is *urahu*, "many." The Bushmen are a race who show considerable artistic skill in their spirited rock-paintings, which are to be found scattered all over South Africa in caves and under ledges of rocks up to the Zambesi and perhaps farther northward, yet their intellectual development is at so low a stage in their savage state and where they have not been influenced by more advanced native tribes, that none can count higher than three. Any number beyond what they can count they simply describe as "many." There are other races in various parts of the world who are unable to form a clear conception of any number beyond 2 or 3, and who express the numeral immediately beyond by some word expressing "many" or "innumerable." The Cape-Yorkers of Australia are said to be able to count as high as 6, but in the following manner: 1, *netat*; 2, *naes*; 3, *naes-netat*; 4, *naes-naes*; 5, *naes-naes-netat*; 6, *naes-naes-naes*. The Abipones of America, it has been asserted, have proper expressions for only these numerals: 1, *iñitara*; 2, *iñoaka*; 3, *yekaini*. To express some of the other numerals they avail themselves of words denoting concrete objects which suggest the number they wish to indicate. Thus, *geyenkñate*, meaning the toes of the American "ostrich," serves to denote 4, since that bird has four toes, three in front and one behind. *Neèn halek*, a beautiful skin with spots of five different

¹⁶ Professor A. H. Sayce, *Introduction to the Science of Language*, Vol. i, p. 101.

colours, is used to denote the numeral 5. Should one ask an Abipone the number of a small quantity of things he answers with uplifted fingers: *leyer iri*, "See, so many." *Hanamhegem*, "the fingers of one hand," in the language of the tribe also means 5; *lanàmrihegem*, "the fingers of both hands," 10; *lanàmrihegem cat gracherhaka anamichirihegem*, "the fingers of both hands and both feet," 20.

¶34. A graphic description is given by Francis Galton of the difficulties experienced by the Damaras of South Africa, who are of a somewhat higher type than the Bushmen, in giving expression to any idea of number. It has been cited by several writers but will bear repetition. "In practice," he says, "whatever they may possess in their language, they certainly use no greater number than 3. When they wish to express 4 they take to their fingers, which are to them as formidable instruments of calculation as a sliding rule is to an English schoolboy. They puzzle very much after 5, because no spare hand remains to grasp and secure the fingers that are required for units. Yet they seldom lose oxen; the way in which they discover the loss of one is not by the number of the herd being diminished, but by the absence of a face they know. When bartering is going on each sheep must be paid for separately. Thus, suppose two sticks of tobacco to be the rate of exchange for one sheep, it would sorely puzzle a Damara to take two sheep and give him four sticks. I have done so, and seen a man take two of the sticks apart and take a sight over them at one of the sheep he was about to sell. Having satisfied himself that one was honestly paid for, and finding to his surprise that exactly two sticks remained in hand to settle the account for the other sheep, he would be afflicted with doubts; the transaction seemed to him to come too 'pat' to be correct, and he would refer back to the first couple of sticks, and then his mind got hazy and confused, and wandered

from one sheep to the other, and he broke off the transaction until two sticks were placed in his hand and one sheep driven away, and then the other two sticks given him and the second sheep driven away.'

¶35. Amongst various races in different parts of the world 5 is denoted by an expression signifying "the whole hand," "the hand finished" or (as amongst the Malays through Polynesia) simply "hand," and 10 by words signifying "two hands." Thus, the Guaranis, a North American tribe, say *po-petei* ("one hand") for 5 and *po-mocoi* ("two hands") for 10. So the Caribs of St Vincent employ the expressions *abana-wajap* and *sun-wajap* for 5 and 10 respectively. Very many instances of the same kind might be given. In the Tlingit language of North America, however, the meanings of these two numeral-words are somewhat different; the word for 5, *kedjin* (*ke djin*) means "up hand" and that for 10 *djinkat* (*djin kat*) means "hands across"; all the ten fingers being, of course, shown, when the hands are placed across each other. We read of the members of an Indian tribe living on the Orinoco that for 5 they use the expression *amgna itòne*, "the whole hand," and for 10 the expression *amgna aceponàre*, "both the two hands." In counting beyond 10 they make use of their toes also; thus for 11 they say "one on the foot." For 20 they use an expression meaning "one Indian" in allusion to the completed number of fingers and toes combined. Of various other races it is on record that to express the numeral 20 they similarly use an expression meaning "a man brought to an end," or simply a word meaning "man." Thus, the Greenlanders to denote 100 use an expression equivalent in meaning to "five men." Of a native Brazilian race we read: They express numbers by means of word and gesture, for instance, to denote 5 they hold out a hand saying *ojepé sé po*, that is to say, "once my hand"; to denote 10 *xe po*, that is to say, "my hands." For

20 they hold out the feet saying *xe po, xe py*, or “my hands, my feet.” To express 13 they use the circumlocution *xe po mocapye cambyra* or “my hands, three besides.” Similarly in Arawak *abar-dakabo*, “my one hand,” means 5; *biam-dakabo*, “my two hands,” is 10; whilst 20 is called *abar loko*, “one man.” Lengua, the speech of an Indian tribe in Paraguay is so unwieldy that the name for 18 can only be represented thus: *sohog-emek-wakthla-mok-eminik-antanthlama*, which, literally translated, means “finished my hands, pass to my other foot, three.”

¶36. With regard to the occurrence of the possessive pronoun of the first person in these last cited forms it may be here mentioned that this usage is very prevalent amongst barbarous races. Thus Professor Sayce remarks: “The difficulty has been noticed of getting a savage or barbarian to give the name of an object without incorporating it into a sentence or bringing it into relation with something else. Thus, a Kurd who supplied Dr Sandwith with a vocabulary of the Zasa district was so little able to conceive of words like ‘head,’ ‘father,’ ‘hair,’ except as related to himself or someone else, that he had to combine them with a personal pronoun, saying *sèrè-min*, ‘my head,’ *piè-min*, ‘my father,’ *poré-min*, ‘my hair’ . . . and Dr Latham points out the same fact in Wallace’s vocabularies from the river Uapes, where *eri-bida*, *eri-numa* in Uanambeu, *tcho-keren*, *tcho-ia* in Juri, and *no-dusia*, *no-numia* in Barré, literally ‘my head,’ ‘my mouth’ are given as equivalents of the simple ‘head’ and ‘mouth.’ He also stated that he noticed the same peculiarity among the English Gipsies.”¹⁷

¹⁷ *Introduction to the Science of Language*, Vol. i, p. 120. Humboldt in his travels refers to the same peculiarity amongst tribes he visited. See also Pott, *Die Quinare und Vigesimal Zählmethode*, p. 15.

¶37. Lichtenstein in his account of his travels in South Africa tells us that a Koussa Kafir, when he mentions a numeral at the same time indicates it with the proper number of fingers elevated. Indeed, by far the greater number of them, he says, do not mention the numeral at all, and generally speaking the numerals are so little used that it takes some trouble to get acquainted with them.

¶38. The method employed by uncivilised races who have attained a somewhat higher range in the art of counting than those to whom reference has already been made to express the numbers between 5 and 10 are various. Thus, among the Joloffs of Africa, according to the traveller Mungo Park, the first ten numerals are expressed in the following manner:

- | | |
|----------|------------------------|
| 1. Wean | 6. Judom wean (5 + 1) |
| 2. Yar | 7. Judom yar (5 + 2) |
| 3. Yat | 8. Judom yat (5 + 3) |
| 4. Yanet | 9. Judom yanet (5 + 4) |
| 5. Judom | 10. Fook |

In the Tonga language of Oceania again these numerals are said to be expressed as follows, the numerals 7, 8 and 9 being represented by expressions denoting deduction of 3, 2 and 1 respectively from 10:

- | | |
|------------|---------------------------|
| 1. Rep | 6. Nel |
| 2. Ru | 7. Me delip ("three off") |
| 3. Thalep | 8. Me ruk ("two off") |
| 4. Eringer | 9. Me rep ("one off") |
| 5. Lahl | 10. Ragach |

In the Danka language, used by a tribe on the Yenesei, these numerals are said to be expressed as follows:

- | | |
|-----------|---|
| 1. Chusem | 6. Ahjem or chajem chusem (5 + 1) |
| 2. Ynem | 7. Ohnem or chajem ynem (5 + 2) |
| 3. Dogom | 8. Chajem dogom (5 + 3) or ynem-botsche-chojum ("2 from 10") |
| 4. Ssyjem | 9. Chajem ssyjem (5 + 4) or chusem - botsche - chojum ("1 from 10") |
| 5. Chajem | 10. Chojum |

Like *duodeviginti* in Latin 18 is expressed in Denka by *ynem-botsche-agem* or "2 from 20" and 11, like *undecim* by *chusem-chojum* (1+10). The numerals higher than 10, when they exist, among barbarous races will, as a rule, naturally be expressed by combinations of the lower numerals, when they are not denoted by such expressions as "man."

¶39. Of a certain Indian tribe, the Ahts, it is stated: "The Aht Indians count upon their fingers. They always count, except when they have learned differently from their contact with civilisation, by raising the hands, with the palms upwards, and extending all their fingers, and bending down each finger as it is used for enumeration. They begin with the little finger. This little finger then is 'one.' . . . When they have bent down the eighth finger the most noticeable feature of the hand is that two fingers, that is, a finger and a thumb, remain extended. Now the Aht word for 8 comprehends *atlah*, the word used for 2. The reason for this I imagine to be as follows: Eight is 10 (or two whole hands) wanting 2. Again, when the ninth finger is down only one finger is extended. The word for 9 comprehends *tsowwauk*, the word for 1." And very generally among the American Indians 5 is "hand," 10 is "two hands" and 20 is "man."

¶40. As a further illustration of the manner in which uncivilised races, somewhat raised above the level of the lowest savages, count we may take the system of numeration in vogue among the Bechuana branch of the Bantu races of South Africa.¹⁸ The Bechuana of old counted on their fingers, beginning

¹⁸ *Notes towards a Secoana Grammar*, by the Rev. W. Crisp, 2nd Ed., London S.P.C.K., 1886. The people who speak the Secoana (or Sechuana) language are the Becoana (or Bechuana).

always with the little finger of the left hand, with the palm held upwards, crossing over from thumb to thumb and completing 10 with the little finger of the right hand. The following are the names of the first ten numerals as they now exist :

| CARDINAL. | ORDINAL. |
|--|----------------------------------|
| 1. N̄oc | Nthla |
| 2. Peli | Bobeli |
| 3. Tharo | Boraro |
| 4. Nnè | Bonè |
| 5. Thlano | Bothlano |
| 6. Thataro or tshélèla | Borataro or botshélèla |
| 7. Shupa | Boshupa |
| 8. Fera (or rōba) menoana e le mobeli; shortened form, fera'meli (or roba'meli) | Boferañ 'meli (or borōbañ 'meli) |
| 9. Fera (or rōba) monoana o le moñoe; shortened form, fera moñoe (or rōba moñoe) | Boferañ moñoe (or borōbañ moñoe) |
| 10. Shome | Leshome |

Several of the foregoing forms are derived from the practice of counting upon the fingers. The first ordinal *nthla*, literally "a point," refers to the thin-tipped little finger, which in gesture denotes the numeral 1. Somewhat similarly one speaks in English of the "top boy" of a school or of a "tip-top" quality or class. The reason why the Bantu races, in common with many other uncivilised peoples, begin their counting with the little finger may be that for some reason they find it more convenient than counting the other way, or that some idea of pre-eminence among the fingers was attached to it. Thus in the folk-lore of the Bavili people it is supposed to say to the other fingers "I am your Chief," whilst among the Kakotchi of Katongo the thumb on the other hand is mentioned as "the slave," "the one apart."¹⁹ The form *thlano* (5)

¹⁹ R. E. Dennett, *At the Back of the Black Man's Mind* (London, Macmillan & Co., 1906), p. 62. Compare with the expression "the one apart" the Greek *anticheir*.

is derived from a verb denoting the turning of the left hand when its five fingers have been counted; *tshélèla* (6) is simply a verb and is used as such in counting, and it means "cross over," since in denoting 6 one must cross over from the left hand to the right. The alternative form for 6, *thataro*, is simply a reduplication of *tharo*, 3, and is probably of later origin than the other, making its appearance when a higher stage had been attained by the people speaking the language than when they counted straight through upon their fingers. By a simple arrangement of some of the fingers of the two hands ocular demonstration was easily afforded that $3+3=6$, and thus a simple sum in addition was effected. *Shupa*, 7, is also a verb, and is likewise used as such in counting, and it means "point out," in allusion to the index or pointing finger of the right hand. In the expressions denoting 8 and 9 *fera* and *rōba* are similarly verbs, and in construction used as such, the former Sechuana word meaning "fold down," and the latter "break off." In the case of 9 the Sechuana words *monoana o le moñoe* mean "one finger" (literally "finger which is one") and in the case of 8 *menoana e le mebeli* mean "two fingers" (literally "fingers which are two"), the plural prefix *me-* in the case of the latter expression taking the place of the singular prefix *mo-* appearing in the case of the former. The number 8 is thus represented by holding up the right hand with the last two fingers folded down, and 9 is represented similarly by only the little finger being folded down; and literally therefore the expressions denoting 8 and 9 respectively mean "fold down" (or "break off") "two fingers," and "fold down" (or "break off") "one finger." In the shortened and more usual forms the words signifying "fingers" and "finger" are omitted.

¶41. Numbers in excess of 10 or of any multiple of 10 up to the next multiple are expressed in

Sechuana by the use of the word *coa*, "exceed," or its substantive *moco*, "excess." Thus:

11. Leshómè ye le coañ ka boñoè-fèla or leshómè ye le moco moñoè-fèla.
 16. Leshómè ye le coañ ka borataro or leshómè ye le moco merataro.

Multiples of 10 are expressed in the following manner:

20. Mashómè a le mabeli ("tens which are two").
 60. Mashómè a le marataro or mashómè a a tshélèlañ.
 90. Mashómè a a ferañ monoana o le moñoè fèla.
 100. Lekgolo.

There is no special Sechuana form for 1,000, but a form of the English name for that numeral, *thausanta* is mostly used; though one sometimes hears of *makgolo a shome* (100×10) and *makgolo a kgolo* (100×100). In explanation of the forms *kgolo*, *lekgolo*, and *makgolo*, it may be mentioned that the last two have respectively a singular and a plural prefix; the first is without a prefix. To show the cumbrous nature of some native systems of numeration the following Sechuana expression for 999 may serve as an illustration: Makgolo a a ferañ, monoana e le moñoè-fèla, a a nañ le mashómè a a ferañ moñoè a a coañ ka boferañ moñoè. To this it may be added that travellers in South Africa in the early part of the last century mention the difficulty and even their want of success in getting hold of the words expressing such numerals as 9 in Sechuana and other native languages; this was perhaps sometimes due to their being unable to conceive of expressions like "cross over" or "fold down two fingers" being used as numeral-words.

¶42. *Shome* (10) in a large number of Bantu languages *kumí*, would seem to be derived from a

verb signifying "cause," "do," or "finish"; the word thus would denote that the counting on the two hands is "done" or "finished." It would appear from a comparison of the various Bantu languages that words expressing the first five numerals and 10 must have existed at the time when the Sechuana stock diverged from the others, before any words existed expressing the intermediate numerals 6, 7, 8 and 9; since, whilst the words denoting 1, 2, 3, 4, 5 and 10 are, as a rule, etymologically the same, with merely dialectical variations, in most of the languages of the Bantu races, the formation of the words expressing 6, 7, 8 and 9 is sometimes very different in them. Thus, instead of forming this last-mentioned set of numerals in the same way as the Sechuana do, others use expressions equivalent to $5+1$, $5+2$, $5+3$ and $5+4$ respectively. As far as can be traced, it seems to be a very general rule that amongst savage races the formation of a word denoting 10 (the number of one's fingers) was prior to the formation of words expressing at least the immediately preceding three numerals. This fact, it will hereinafter be seen, has an important bearing upon the origin of the numeral-words for 7, 8 and 9 in the English language and in the Indo-Germanic languages generally.

¶43. It has been pointed out that the Bechuana have two alternative forms for expressing the number 6, arising from the fact that such a number may be denoted in more ways than one by means of the fingers. So also in the Denka language 8 may be expressed either as " $5+3$," or " 2 from 10." In Latin one may say *undeviginti*, " 1 from 20," or *decem et novem*, " $10+9$." In English one may say "eighty" or avail one's self of the far less usual expression "four score." Some languages, however, go much farther than this. Thus in the Tsimkian dialect of the North American Indians various sets of numerals are used for various classes

of objects. One of these sets is used for simple counting. The others designate flat, long and round objects, human beings, canoes and measures. Complexity of language is often an attribute and sign of the savage; simplicity of language and of word-form, as in the case of our numeral-words, the mark of civilised man.²⁰ Nevertheless we find that in English several words, each of which has the force of a numeral-word denoting 2, are used in various connections, such as "brace," "couple," "yoke," "pair," "deuce."

¶44. It may here be noted that, natural as it may seem to us to count the number of our years of age, these natives of the Bantu race, in their original and uncivilised state at least, have not the slightest conception of the ages of themselves or of anyone else. Possibly the idea of number in connection with years is one too complex to suggest itself to the native mind; in fact, the very idea of a year is not one that is conceived of by man in an original state of barbarism.²¹ When he has obtained an idea of a month by noticing the periodic returns of the same phases of the moon, he will thereafter probably at first reckon time by months, and later on count those returns on the fingers of his two hands, and make his year consist of ten months, till he has learned by continued observation that there is something wrong in his system and that the number of twelve such months is approximately correct.

²⁰ *Handbook of American Ethnology*, Government Printing Office, Washington, 1910, p. 396.

²¹ Whewell, *History of the Inductive Sciences*, pp. 113 and 126. Barrow in his *Travels in the Interior of South Africa*, Vol. i, p. 218, remarks of the Kafirs: "Their only chronology is kept by the moon." It has been suggested that the "years" of Methuselah's age were lunar periods, the designation for an annual period having in his day still been unknown.

¶45. Drawing general deductions from the matters which have been discussed in this chapter, we may conceive that, in the process of man's intellectual advancement in respect of his grasp of the concept of number, he would at first have acquired an idea merely of unity, and then also of duality and afterwards that which is in excess of duality. There is reason to believe that, in languages in which a dual as well as a plural number is found in declensions and conjugations, the dual is much older than the plural number. After the idea of three definite numbers had developed itself, the next two numbers which would come into his cognisance and comprehension would have been 4 and 5; but probably in many or most, if not all, cases he would have had a name for 5 before he had a name for 4, since his five-fingered hand would have supplied him (as it does in many cases at the present day) with a ready method of denoting 5, whilst there was nothing by which so obviously to indicate and name 4. Since he already had a name for 1, it would not be surprising if there were cases in which he expressed 4 by saying "5 less 1." After that he would have gained an idea of the numbers 6 to 10; but in this case likewise he would have acquired a name for 10 before he acquired expressions for 7, 8 and 9, inasmuch as the designation "two hands" would have furnished him with a name for 10; hence the cases where 9 is expressed as "1 off 10," 8 as "2 off 10" and 7 as "3 off 10." He then probably would have advanced, in the case at least of a community which for agricultural or other purposes took special note of the seasons, to the numbers 11 and 12, in relation to the number of months in the year in excess of the number of fingers of his two hands. And gradually, as men experienced more and more the utility of a method of expressing still higher numbers, the more intelligent amongst them would have devised the means of doing so by forming combinations out of the lower numeral-words, and

these expressions would in course of time have come into common use. In the next following chapter we shall endeavour to show that in the manner here described the Aryan or Indo-Germanic numeral-words actually came into being.

CHAPTER VI

ORIGIN AND MEANING OF THE ARYAN NUMERAL-WORDS

¶46. IT is a well-authenticated fact, as has already been shown in the foregoing pages, that in the case of a large number of savage races the numeral 5 is represented by expressions signifying "the hand finished" or "the whole hand" or simply "hand," and that the numeral 10 is very frequently represented by words signifying "two hands." To those who accept the theory that, as facts of various kinds seem to indicate, all mankind existed originally in a savage state, the *a priori* conclusion naturally suggests itself that in the case of the Indo-Germanic tongues similar origins may be ascribed to the words signifying these two numerals respectively; and indeed it would be a rather singular and almost unaccountable circumstance, assuming the correctness of this theory, if the words expressing these two numerals had an origin of a different nature. An investigation into the nature of these words will, independently of any such *a priori* reasoning, lead to the conclusion that in the case of the numeral-word for 10 we have an expression denoting "two hands" and that the word "hand" or an equivalent form probably constitutes a component part of several other primary and of many compound numeral-words in these languages. This matter is further illustrated, in the case of the Latin numeral-words, by some of the figures with which the

Romans represented several of these, and which very possibly came into use before their adoption of an alphabet, and at a time when the original meanings of the words denoting the numerals were still well understood. The number 5 was represented by V and the number 10 by X. Now V is generally, and no doubt correctly, accepted as having been in its origin a rude and simple representation of the uplifted open hand, one stroke standing for the thumb and the other stroke for the other four fingers kept together; the one for the *antichair* of the Greeks, the other for the *chuir*. Again, a simple way of representing 10 was to cross the two hands, thus showing the ten fingers and forming a figure like X. With the Tongas, a Bantu tribe, when they indicate numerals with their hands, "five, the left hand with the thumb separated from the other fingers, imitates the Roman sign of V; and ten, the two hands united, crossing each other make an X, the Roman sign for ten. This shows that our numeration, of which we are justly proud, began in the same way as it did amongst the Bantu."²² These figures remind one of the Tlingit expressions for 5 and 10, respectively meaning "up hand" and "hands across." Moreover 9 has been represented (from what period the present writer, however, is unable to say) by IX, which denotes I deducted from X, just as also 8 has been represented by IIX, which denotes II deducted from X—alternative and the early Roman forms for 9 and 8 respectively being VIII and VIII—and 4 by IV, which denotes I deducted from V, whilst 20 was graphically represented by XX, which denotes twice X or twain-two-hands, and so on. It may perhaps be rightly expected that this manner of representing the numerals would correspond with the derivations

²² *The Life of a South African Tribe*, Vol. ii, p. 148, by Henri A. Jounod, Neuchatel and Macmillan & Co., London, 1913.

which we have to attribute to the words representing them in the Aryan languages.

¶47. To begin with 10; this numeral is represented in Gothic by *taihun*, or by a more original form *taihund* and by *têhund*, appearing in *taihun-taihund* and *taihun-têhund* (10×10 or 100). There can be but little doubt that the second syllable of *taihund* is connected with the word "hand," Gothic *handus*, Anglo-Saxon *hand* or *hond*. The numeral-word in Gothic for 2 is *twai*, and there seems to be no good reason to doubt the correctness of the opinion of several philologists that this word is connected with the first syllable of *taihund*.²³ And indeed it can hardly be doubted that, if the second syllable of *taihund* is connected with "hand," the only meaning which can be attributed to the first syllable must have been one of duality. There is certainly no doubt that the elements which appear in the Gothic *taihun* are those that occur in the Latin *decem* (appearing also in an ancient inscription as *dekem*, which gives us the proper pronunciation of the word), Greek *deka*, Sanskrit *daça*. These differences of form of the word are in accordance with the well-known law relating to the permutation of consonants in the various Indo-Germanic languages (¶9), and the *h* in *taihun* is represented in Latin by *c*, in Greek by *k* and in Sanskrit in this case by *ç*. The compound word expressing 10 may be suggested to have at one time appeared in the parent language of Latin and Greek as *due-kent*, simplified into *de-kent* or perhaps preferably, as philologists might think,

²³ See Walde, *Etymologisches Lateinisches Wörterbuch*, 3rd Ed., s.v. *decem* and *com-*, *cum*. The labial element in *twai* need apparently create no difficulty. See the same work s.v. *dis-* and *biennium*. In the Greek *dodeka* and in the English pronunciation of "two" the labial element is absent.

dec-kemt simplified into *de-kemt*.²⁴ In a previous chapter it has been pointed out that, independently of any deductions derived from the forms of the numeral-words, there is reason to think that a word *kent* (*kemt*) denoting "hand" existed in our primitive language. At that period of time nouns appear as yet to have had no plural, and probably no dual, forms. To the form here mentioned of the second syllable of the numeral-word expressing 10 corresponds the second syllable of *deszimt* (10) in Lithuanian—a language which has preserved the final *t*, as in many other cases it has preserved the older forms of words. Traces of this form, and particularly of the final *t*, are often still preserved too in the words denoting the multiples of 10, for instance in Latin *triginta* (30) for *tria-dekent-a* (with the neuter plural suffix, "three two-hands"), the letter *g* having taken the place of the letter *c*, as also happened when *vigesimus*, "twentieth," was used for *vicesimus* and *trigesimus*, thirtieth, for *tricesimus*.²⁵ It would seem that by the time the compound numeral-word denoting 30 came into being plural forms for nouns had been acquired. In Greek there is a similar relation as in Latin between an original *dekent* (10) and *tria (de) konta* (30). In these cases there is a difference of vowel between the second syllable of the word denoting 10 and the penultimate syllable of that denoting 30; the difference, however, is immaterial, and need not now be dilated upon. The second syllable of *decemt* is, as will hereinafter sufficiently appear, identical with the first syllable of the Latin *centum* (100) and a similar identity of course exists in the case of the allied

²⁴ The forms generally appearing in works on philology are **de-kemt*, **de-kmt*, but a simpler notation is purposely followed in the text. The second of these two forms in fact appears to be rather mythical. (See footnote 45.)

²⁵ Until the letter G was introduced into the Latin alphabet, the letter C represented the sound of both of these letters.

languages. *Decent* (*dekent* or *dekemt*) generally lost its final dental letter, hence such forms as *decem* in Latin (which in any case preferred *m* to *n* as a final letter) and Gothic *taihun*. In the compound words denoting the numerals between 10 and 20 *decem* becomes *decim*; *e* changing into *i* as in the cases of *viginti* (20) and *triginta* (30). In the Latin ordinal form *decimus* the *t* is also wanting, whilst it appears in the Lithuanian *deszintas*. In Greek, after the loss of the final *t*, *deken* took the form of *deka*; the changing of *en* into *a* being not uncommon in that language, whilst in the ordinal *dekatos* a letter *t* appears. The old German form corresponding to *taihun* was *zehan* (which in respect of meaning may be compared with *zwei hand*, "two hand"), modern German *zehn*, English "ten" or "-teen." In the English words the guttural element represented by the Gothic *h* has entirely disappeared. In the Latin *deni*, "by tens," the guttural element is also not to be found; but it will serve no useful purpose to discuss its disappearance in that language. In Lithuanian, as has already been remarked, we have *deszimt* (pronounced *deshimt*) and in Sanskrit *daça*. Perhaps the interchange in these and in other allied languages of a guttural with a sibilant ought to be considered no more remarkable than that we now pronounce "cent" as *sent* and "decent" as *desent*. An extract from an ancient plebiscite given by Festus (*s.v. pondera*) *sexdequimque librae in medio sint* introduces a labial element after the guttural; this is most likely merely due to a misspelling, since, in Cicero's time at least, *qu* appears to have been pronounced like *k*. In several languages, by a wearing away process, the second syllable of the primitive numeral-word expressing 10 has entirely disappeared, as in the case of the Welsh *deg* and the Gipsy *desz*.

¶48. In various languages in which the origin of

the numeral-words can be traced the numeral-word denoting 9 is represented by words of which the original meaning was "one off ten." Thus in the case of the Ainos 1 is *schnepf*, 10 is *wambi* and 9 is *schnebischambi*; so also 2 is *tupf* and 8 is *tubischambi*. In the Denka language, as has been previously observed, 9 is denoted by the expression *chusem-botsche-chojem* or "one off ten," just as in that language, in like manner, 8 is denoted by an expression meaning "two off ten." The same idea is differently expressed in other native languages, as in the Sechuana combination of words expressive of 9 meaning "fold down" (or "break off") one finger. So also the expression used by the Aht Indians to denote 9 comprehends their numeral-word for 1, since 9 is 10 (or "two whole hands") wanting 1. There is therefore some *primâ facie* ground for supposing that in the Indo-Germanic tongues a similar construction would have been followed when a word denoting 9 came into being. Furthermore, in Latin 19 is expressed by *undeviginti* ("one off twenty") and 29 by *undetriginta* ("one off thirty"), and so on; and 19 very similarly in Sanskrit is represented by *unavimçati*; the conclusion, therefore, again is naturally suggested that in these and the other Indo-Germanic languages the numeral-word for 9 would have been formed in a similar manner. It has further already been remarked above that the numeral 9 is often graphically represented by IX, which at all events shows that in the minds of those who first employed this figure there must have been present the idea of a deduction of 1 from 10, and so far as it goes gives support to the possibility that the Indo-Germanic word for 9 means "one off ten." Apart, however, from any *a priori* reasoning founded upon the principle that our numeral-words are in all probability similar in origin to those in the language of the savage where the meanings of such words can be traced, an investigation of the Indo-Germanic

numeral-words for 9 seems to reveal an origin of that word identical with that found in the case of the languages referred to in the beginning of this paragraph. This we shall now proceed to show. The Greek numeral-word for 9 is *ennea* (earlier *ennefa*), the final letter representing, as in the case of *deka* (10) an earlier *en* (*em*). Now, the first syllable of *ennea* is held by philologists of note to be identical with the final two letters of *ouden*, "nothing," and to mean 1. If this be its meaning, which one can hardly doubt, the possibility seems to be excluded of the whole word meaning anything else than "one off ten," or, going back to the original meaning of the numeral-word for 10, "one off two hands," or more simply still, "one off the hands," the numeral 2 being understood.²⁶ It may be surmised, then, that the more original form of the suggested early Greek word for 9 *ennefen* was something like *en-ap-ken* or, with the guttural *k* lapsing into an aspirate, *en-ap-hen*. A preposition must already have existed in the parent language corresponding to the Latin *ab*, Greek *apo*, Sanskrit *apa*, Dutch *af*, English "off" with its original meaning of "away from," as in the case of the Denka *botsche* or of *de* in the compound Latin numeral-words of later origin *undeviginti* (19), *undetriginta* (30), and so on. In the process of corruption of the numeral-word for 9 the guttural became an aspirate or it was otherwise modified, as would appear from the Anglo-Saxon *nigan*, Dutch *negen*, or it disappeared.²⁷ The corresponding

²⁶ In the case of the numeral-words for 7 and 8 the dental indicative of duality appears. These numeral-words may have come into use at a somewhat different time.

²⁷ Professor A. H. Sayce has remarked that in many languages *k* has a tendency to become an aspirate. In Latin the guttural was very unstable; we have not only the perfect *traxi* and supine *tractum* with the present infinitive *trahere* but *unde* for *cunde*, *ubi* for *cubi*, and

numeral-word in Latin is *novem*. This language, like a good many others of the Aryan languages, seems sometimes to have dropped an initial vowel where in Greek it was retained, for instance in the cases of *odous*, Æolic *edous* (= *edouts*=*edents*), Latin *dens* (dent-s), Dutch *tand*, English "tooth"; *onoma*, Latin *nomen*, English "name." In this way the initial vowel must have been eliminated in these languages in the case of the numeral-word for 9. When an initial vowel was dropped the sound or length of the next following vowel was generally modified in Latin. This fact by itself would not yet account for the vowel *o* in the first syllable of *novem*. But it may be supposed that the section of the Indo-Germanic stock which afterwards became the Latin-speaking people already before its separation as a distinct community used *oen* or *un* (as in *undecim*, II), as a root-form to express the numeral I, and in fact had already developed a distinct dialect, though the structure of their language had remained much the same as that of the rest of the people of the Indo-Germanic stock. It may be supposed, then, that with the dropping of the initial vowel, and the transformation or elimination of the guttural, a form *novem* arose, as if from an original *nu-ap-kemt*, or, with the guttural lapsing into an aspirate, *nu-ap-hemt*, *nu-ap-hem*.²⁸ The identity of termination of *novem* and *decem* is thus accounted for. To suppose that this identity would be due to the mere force of imitation or analogy is not quite

so on. In the ordinal *deni* (by nines) the guttural has disappeared. A modification of Latin *c* into Anglo-Saxon *g* is found in the Anglo-Saxon prefix *ge-*, corresponding to the Latin *com-*, *co-*; in fact these prefixes may possibly be connected with the same root as that of the second syllable of *decem*. (Walde, *Lateinisches Etymologisches Wörterbuch*, 2nd Ed., s.v. *com-*, *cum*.)

²⁸ The weakening of a guttural and also the conversion of *ua* into *o* are exemplified in the word *dodrans* for *dequadrans*.

reasonable. If it were a case of mere imitation or analogy one would expect that, since we have the same termination in the Latin *septem* (7) we should also find it in the Latin name for the intermediate numeral 8, which is *octo*; such is therefore not the case. In such forms as *nundinae*, *nonussis* the Latin numeral-word is brought into close resemblance to the German *neun*, and the English "nine." In a form of the Gipsy language spoken on the Continent of Europe *ennyo* and *nu* are both to be met with expressing 9. Lettish and Lithuanian respectively have the anomalous forms *dewini* and *dewyni*; probably owing to a change of an initial *n* resulting from the influence of the initial letter of the next numeral word, a *d*. In concluding the discussion of the numeral-word for 9 it may be remarked that in any case the supposition of an original form *novem* connected with the Latin word *novum*, "new," as if this numeral were the first of a new tetrad after 8, seems more than unlikely and finds no support in any other allied language nor in the usage of savage races, and does not account for the identity of the termination of this numeral-word with the termination of either *decem* (10) or *septem* (7), which, however, must in some reasonable way be accounted for.

¶49. What precedes in this little treatise has been written to very little purpose if the reader is not convinced that there is strong reason for believing that the word "hand" or an equivalent form enters as an ingredient into the composition of the numeral-word for 10 and probably also into that of the numeral-word for 9. And as the numeral-word for 7, as a rule, in the various Indo-Germanic languages has the same termination as the numeral words for 9 and 10, the supposition at once arises that the same ingredient also enters into the composition of the numeral-word for 7. The accentuation of the Greek form of this numeral-word, *heptá*, shows that the

termination is an essential portion of the word. Following the analogy of the derivation already given above to the numeral-word for 9, it may be conjectured that the numeral-word for 7 means "three off ten." As has been pointed out previously, the number 7 is in many native languages expressed by words bearing such a meaning. It will hereinafter be suggested that the numeral-word for 6 is a reduplication, and the theory may now be advanced (to be more fully discussed later on) that the simple form of word of which the numeral-word for 6 is suggested to be a reduplication, and which must necessarily have meant 3, enters into the composition of the numeral-word for 7. Supposing this form to have been *se*, the earlier and simpler form of the Latin numeral-word for 7, *septem*, would have been *se-ap-dekem*. In the Greek *heptá* and the ordinal form of the numeral, *hebdomos*, we have an aspirate instead of an initial sibilant, just as in the case of the preceding numeral-word *hex*, Latin *sex* (6) and in other Greek words, and in the ordinal the letters *d* and *m* appear, as in the suggested original form of the numeral-word denoting 7. In the Malberg glosses one finds the forms *septun* and *septen*; otherwise, in the Germanic languages the dental element which appears in the classical and other languages is absent, as it is in the case of 9 in all the Indo-Germanic languages. In Lithuanian, whilst the cardinal numeral-word gives prominence to the dental and labial in *septyni*, the ordinal appears in the form *sekmas*, giving prominence to the guttural. In the Irish *seacht* also the guttural is preserved; with it may be compared the German *acht*, Latin *octo*, for 8. In appearance the Anglo-Saxon *seofan* or *seofon* makes a very close approach to a primitive form such as has been here suggested, putting it as *se-off-hand* or *se-off-hond*. From it is of course derived the English "seven." If the question is perhaps asked why the ordinary form of the numeral-word for 3

does not enter into the composition of the numeral-word for 7 the answer seems to be this: that in counting 7 the fingers of the right hand were brought into use and that, as will hereafter be shown, whilst apparently the ordinary form of the numeral-word for 3 was associated with the middle finger of the left hand, the form actually entering into the composition of the numeral-word for 7 was seemingly associated with the middle finger of the right hand, with which finger, it will hereinafter be suggested, the form *se* was connected. If that middle finger together with two other fingers on the right side of it (and thus three fingers) are depressed, they leave two fingers, which together with the five fingers of the left hand make 7.

¶50. Next we may take into consideration the numeral-word for 8. In doing so we need not dwell upon the extreme unlikelihood of the Latin *octo*, Greek *okto* and the etymologically equivalent numeral-words in the other Indo-Germanic languages being connected, as has been elsewhere suggested, with the Latin *acer*, "sharp" and *ocris* "a rugged mountain." The Latin and Greek numeral-words for 8 are in the dual number, and it is not likely either that, as has likewise been suggested, this fact is due to the primitive people of the Indo-Germanic stock having counted by tetrads; for that they would have so counted is in itself very improbable. Moreover, it is not likely that the numeral-word for 8 denotes "twice four," for this reason that no trace of such a formation is to be discovered in that numeral-word itself beyond the fact that it appears in a dual form. But if it is first established with reasonable certainty that the numeral-words for 7 and 9 respectively mean "three off ten" and "one off ten," it must almost inevitably follow that the numeral word for 8 (the number between the two) must mean "two off ten." Such is the case, amongst others, with the Denka expression *yucm*

botsche chojum, with which may be compared the Sechuana expression equivalent to "fold down" (or "break off") "two fingers." Now there are two root-forms which are supposed to have expressed duality; the one—a somewhat problematical form—*u* (*ui*) alleged to be present in the first syllable of the Latin *viginti* (20), and the other *du* (*dui*) found ordinarily in the numeral-words denoting 2, like Latin *duo* and "two." From *u-ap-dekem* we might, following in respect of its termination, the analogy of *septem*, and with a very natural transposition of the guttural and dental letters, get *uactem* or (much in the same way as *dequadrans* gives us *dodrans*) *octem*, which, in respect of its termination, corresponds to the Sanskrit form *asta*. Of this termination there is possibly a trace in the numeral-word *octingenti* (80). But it may be conceived that when dual forms came into being, and the full meaning of the compound numeral-word denoting 8 was lost sight of, it would have been supposed that the prefixed root-form expressive of duality required a dual termination. Thus, then, the Latin and the Greek dual forms and the alternative Sanskrit form for 8 *astau* came into existence. If, however, we suppose (as indeed appears to be more likely) the original form of the numeral-word for 8 to have been *du-ap-dekem*, it may be further conceived that when a dual form was arrived at, the initial *d*, as indicating duality, was discarded as superfluous, since the numeral-word itself was now in the dual form. It will be mentioned hereafter that possibly, much in the same way, the Latin word *viginti* (20) was stripped of an initial *d* corresponding to *t* in the English "twenty," and the Greek numeral-word for 20, *eikosi*, was stripped of the two letters at the beginning of that word representing *tw* in the English numeral-word; both the Latin and the Greek numeral-word in this case being in a form of the dual number. In the Welsh numeral-word for 8, *wyth*, there seems to be a trace

left of the original formation of this numeral-word. In Anglo-Saxon it appears in the form *eahta* (in which the *h* is a guttural), Dutch and German *acht*, English "eight."

¶51. The number 6 may be indicated by means of the fingers either by counting the five fingers of the left hand and in addition thereto the thumb of the right hand, or by holding together three fingers of both hands. The former method is one of addition, the latter of multiplication. The Bechuana, it has already been pointed out, have two alternative words to express 6, formed respectively in accordance with these methods; the one word *tshélèla* means "cross over" (to the right hand after counting five fingers of the left hand); the other, *thataro*, is simply a reduplication of *tharo*, which means 3. It has been supposed by some that also the Indo-Germanic numeral-word, represented, for instance, in Latin by *sex*, is really a reduplicated form of a word denoting 3 and consisting of at least a sibilant and a guttural; and certainly its form, as well as the analogy of one of these Sechuana numeral-words, suggests such a derivation of the numeral-word. We do not, however, actually meet with such a word denoting 3 except the Kurdish *seh*, which perhaps we have not sufficient ground for connecting with the word of which the numeral-word for 6 would be a reduplication. It will be suggested hereinafter (¶56) in dealing with the numeral 3 that a form *se* may have been connected with the middle finger of the right hand, and may have come into use to denote that numeral in the formation of the numeral-words denoting 7 as well as 6. As three fingers of the right hand and also three of the left hand are engaged in counting 6 as a reduplication of 3, it would not seem unnatural, if this suggestion be well-founded, that 6 should have been represented by the reduplication of a form connected with the middle finger, the third from either side, of the right

hand. It may also be suggested that if ever such a form for 3 by itself had come into use in the primitive language it would have been very natural that such use should have been discarded in favour of the alternative form for 3 in compound numeral-words, since confusion would very easily have arisen between the simple and the reduplicated forms in the case of the compound numeral-words; in Latin, for instance, where *sedecim* stands for 16, it certainly would have had that effect.²⁹ The original form of *se* probably comprised a guttural at least. In Cornish the sibilant falls away at both the beginning and the end of the numeral-word for 6, and is thus represented by *huik*. In several languages a more complex form of the initial consonant or consonants occurs in the numeral-word expressing 6 than in that which expresses 7; supposing them to have originally been the same in the two cases, it may be that an original form was better preserved in the reduplication that expressed 6 than in the compound word expressing 7.

¶52. In discussing the numeral-word for 5 it will be necessary to point out that there appears to be a certain relation between this numeral-word and that which expresses 4. It is this namely, that, whilst the numeral-word for 5 apparently consists of a certain element and a prefix, the numeral-word for 4 apparently consists of the same element and a suffix. And it may be laid down that, as a consequence of this seeming fact, in the Indo-Germanic languages, as a rule, the numeral-word for 4 begins with the same letter as that with which the second syllable of the numeral-word for 5 begins in the case where the latter word is dissyllabic, or with the same letter, or a modified form of the same letter as that with which the word representing 5 ends where,

²⁹ The Latin reflexive pronoun, it may be noticed, is used in the forms *se* and *sese*.

by mutilation of the second syllable, this word has become monosyllabic. This supposed relation between these two numeral-words will be best illustrated by a tabulated statement.

| | 5 | 4 |
|--------------------------------|---------|----------|
| Sanskrit | Pañca | Catvaras |
| Æolic and Epic Greek | Pempe | Pisures |
| Attic Greek | Pente | Tessares |
| Latin | Quinque | Quatuor |
| Welsh | Pump | Pedwar |
| Gothic | Fimf | Fidwor |
| Anglo-Saxon | Fif | Feower |
| Irish | Coic | Ceather |
| Lithuanian | Penki | Keturi |
| Afghan | Pinse | Salur |

Now if we regard the manner in which savages find an expression for the numeral 5, we see that frequently they use a word simply meaning "hand" or a compound word meaning "whole hand." If it be established by sufficient evidence that probably the word signifying "hand" enters into the composition of the Indo-Germanic word denoting 5, it may be surmised that the original or nearly original form of that numeral-word was *pent-kent* (a form best preserved in the Lithuanian word *penki*, 5, and the first syllable of *keturi*, 4, this language being more retentive of archaic forms than any other Indo-Germanic tongue); that through assimilation of the initial letters of the two constituent parts of this numeral-word (perhaps for the sake of greater facility of utterance, and perhaps also because a barbarous race, accustomed to reduplications as such a race generally is, would readily have supposed the existence of a reduplication), a form of word came into being among a section of the Indo-Germanic race the two syllables of which each began with a sound which was a compound of a guttural and a labial; that, in consequence of the

accent falling upon the first syllable or element of the compound word, the second syllable was mutilated; that in some of these languages the guttural and in others the labial element prevailed over the other, which was discarded; and that in this manner the various forms of the numeral-word came into being.³⁰ If this surmise be a correct one, the first syllable or element of the compound word expressing 5 would in all probability have had the meaning of "whole"; and if we suppose that an assimilation of vowels in the two syllables also took place, it may perhaps be brought into etymological connection with the Greek *pan(t)*, which bears the meaning of "whole."³¹ In Æolic Greek this numeral-word appears in the form of *πέμπε*, which is preserved in the verb *πέμπασειν*, "to count on the five fingers," relating back to the time when men counted on the fingers of one hand and no higher than the number thereof. In Attic Greek the numeral assumed the form *πέντε*, or in combinations

³⁰ As to this last point one may perhaps compare the English pronunciation of "who" (A.-S. *hwa*; Latin *qui*) and "what" (A.-S. *hwæt*; Latin *quod*). In the case of the former the labial has disappeared in pronunciation; in the latter the aspirate (formerly a guttural) is hardly heard, in fact the word is often pronounced as *wot*. In some of the Italic languages the Latin *qu* was represented by a *p*. Professor Sayce refers to the "original obscure sound" of the consonants. (*Comparative Philology*, 2nd Ed., p. 245.) The current assumption of philology as to the original form of the numeral-word for 5 hardly accounts for all the facts of the case.

³¹ Miss C. T. Stewart in an article on *The Origin of the Names of the Numerals* in Bezenberger's *Beiträge zur Kunde der Indo-Germanischen Sprachen*, xxx, p. 223, connects the numeral-word under discussion with the Sanskrit *pāni*, "hand." The difference of the vowels seems to offer her no difficulty. An objection to her theory, however, is that, supposing the actual word "hand" or its etymological equivalents enter into the composition of the numeral-words, two different words, each meaning "hand," are not likely to have been used.

penta, which, if it was not directly derived from *pent-kent*, must have had its origin in the form *pempe*, in the same way perhaps as in England "Hants" is used for "Hamps" as a contraction for "Hampshire," or as possibly in Latin *pompifex* became converted into *pontifex*. In Welsh the corresponding form is *pump*, in Gothic *fimf*, in German *fünf*, in Anglo-Saxon *fiſ*, hence the English "five" and the first syllable in "fifteen" (five-ten) and "fifty" (five tens). In Irish, where the gutturals have prevailed over the labials, the numeral is represented by *cuig* (*coic*).

¶53. If the word "hand" enters into the composition of the numeral-word for 4, as very naturally one might expect it would, one can only conjecture that the original meaning of this numeral-word must have been "whole hand wanting one" or simply "hand wanting one," in the same way as in the Haida language of North America *láaliñgis-goansingo*, 9 (from *láal*, 10, and *sgoansin*, 1), means "ten wanting one," or as the Gipsies say, *dej sore but jek*, "ten all but one" for 9. We may conceive, however, that the word denoting 1 was suppressed or understood.³² We may conceive further that, for instance, the more original form of the Lithuanian *keturi* had been something like *pen(t)ke(n)turi* and that analogous forms for this numeral had existed in the other Aryan languages, the compound word in each case denoting "whole hand wanting (one)"; that the first syllable or

³² In the language of one American tribe the expression for 9 simply means "ten wanting," the word for 1 being suppressed or understood, as is suggested in the text above may have been the case with regard to the Indo-Germanic numeral-word for 4. Conversely, in the Latin *deunx*, *dodrans* and *dextans* the word denoting the unit from which the deduction is made was omitted. In the Tonga expression for 9, *me rep* ("one off") the word for 10 remains unexpressed.

element meaning "whole" had been discarded at an early stage as being superfluous and inconveniently repeated in two successive numeral-words; and that in the case of the Greek and some other of the languages a declinable termination serving to denote gender was at a later time formed by analogy with the preceding numeral 3. The preposition denoting "wanting" would have had a meaning, and perhaps a form, similar to that which occurs in the expression *tesserakonta para mian*, "forty save one," which the Apostle Paul uses to denote 39 (2 Corinthians xi. 24). Graphically the numeral is often represented by IV, indicating a deduction of I from V.³³

¶54. We may now discuss the forms of the first three numeral-words, leaving the discussion of their possible meanings to a later paragraph. The first numeral-word generally appears in the Indo-Germanic languages in a form of which "one," "an," "a," Gothic *ains*, Latin *un* (found in *underiginti*, *undecim* and *unus*), old Latin *ænus*, Greek *oiné* ("ace") are types. In Sanskrit we have *eka*, which may be from the same root with the suffix *ka*.³⁴ In a Greek dialect mentioned by

³³ Miss C. T. Stewart, who, independently of the present writer, arrived at the conclusion that there existed a relation between the numeral-words for 4 and 5, suggests that the Sanskrit *catur*, 4, arose from a combination of *pañca*, 5, and the root *tr* of *trayas* (3) so that it denoted the number between 3 and 5, in the same way as South-East is a description of the direction between South and East. This conjecture, however, seems far less likely than that of the origin of the numeral-word denoting 4 given in the text, and probably no analogous case of such a kind in respect of the numerals can be cited from the language of any past or living race.

³⁴ *Latin Philology*, edited by C. L. Meader (New York, The Macmillan Company, 1910), p. 13. If the analysis of the numeral-word for 9 in ¶48 be correct, the Sanskrit *nava* would seem to indicate such a simple root.

Hesychius *ingia* was used to denote 1. From the Latin *unus* we get the word *nullus* (*ne-unu-lus*) signifying "no one," in the case of which word we have to do with a negative, the intensity of which is augmented by the word being put in a diminutive form; but Festus mentions an ancient form *ningulus*, with which may be compared the Dutch *enkel* ("single") from *één* ("one"). In Homeric Greek one meets with the forms *ios*, *ia*, *ion*. In Attic Greek the words meaning 1 in ordinary use were, for the masculine *heis* (for *hens*) and for the neuter *hen*, corresponding etymologically with the first syllables in the Latin *semel*, *simplex* and *singulus*. It would appear that in *ennea* (9) and in *oudeis* "no one" and *ouden* "nothing" we find the forms *eis* and *en* also signifying one, but these were not otherwise in use. The feminine numeral-word in Greek denoting 1 is *mia*, and it has been sought to connect this form with *heis* and *hen* by supposing that the original forms of respectively the masculine, feminine and neuter genders were *sems*, *smia*, *sem*, before the sibilant became an aspirate. As regards the ordinal forms of the first numeral in the various Indo-Germanic languages, we invariably find that they are not derived from the cardinal forms as is usually the case with the other numerals, but are, very naturally, words conveying the idea of that precedence which number 1 has of all the other numerals. For instance, in English we have "first," in Dutch *eerst*, "erst," in Latin *primus*. With this may be compared the Sechuana *nthla*, which may be freely translated as "tip-top," with reference to the pointed end of the little finger, with which the Bechuana commence their counting of numbers.

¶55. The forms in which the numeral-word denoting 2 appears in the various Aryan languages are, generally speaking, very similar to each other, making allowance for the ordinary interchange of

the letter-sounds. The English "two" is thus represented in Latin by *m. duo*, *f. duæ*, *n. duo* earlier *dua*, Greek *duo*, Sanskrit *dvi*, *dvau*, Lettish *dvēi*, Lithuanian *dvėi*, German *zwei*, Dutch *twee*, etc. When and where dual forms came into being this numeral-word naturally assumed a dual form. The form of the numeral-word oftentimes underwent changes, due to the natural tendency towards simplification in the case of a compound sound like *du*. In some of the derivatives of this numeral-word the dental falls away and the labial is transformed as in the case of *bis* in Latin for *duis* and *bellum* for *duellum*. (Perhaps with this may be compared the English "Bill" for the contracted form "Will.") In other words again it would seem that the labial falls away leaving only the dental, as, for instance, in the Greek *dis-*, in the Latin prefixes *dis-* and *di-* and perhaps *de-* and in *decem* (10).³⁵ (Compare the dropping of *w* in the English pronunciation of "two.") As regards the ordinal forms of the numeral-word under discussion, in Greek the form *deuteros* is derived from the cardinal in the shape of an adjective of the comparative degree; there is, as it were, a comparison of one position with another preceding one.³⁶ In Latin, as in the case of several others of the other Aryan languages, the numeral 2 has no ordinal derived from the cardinal numeral-word; in that language *alter*, "other," or "secundus," "following," was used. There is very good reason for this usage; when two things

³⁵ Walde, *Lateinisches Etymologisches Wörterbuch*, 2nd Ed., s.vv. *dis-*, *com-* and *decem in fine*. Max Müller, *Lectures on the Science of Language*, New Ed., Vol. ii, p. 272.

³⁶ Pott, *Die Quinare und Vigesimal Zählmethode*, p. 213 *in notis*; Miss Bagge, "The Early Numerals," in the *Classical Review* for June, 1906, p. 266. Both reject the connection suggested by Brugmann as existing between this ordinal and the verb *deuomai*, "to lack." A form *deutatos* ("secondmost," "last") appears in Homer.

are dealt with it is very natural, after the mental elimination of one of them, to speak of the remaining one as "the other" or "the following." In Swedish *den andre*, *det andra* and in Danish *den anden*, *det andet*, "the other," are used in the same way as the Latin *alter*. So also the Germans say *anderthalb* ($1\frac{1}{2}$) where, from the analogy of their usage in other cases, one might have expected *zweitehalb*.

¶56. The third in order of the numeral-words appears in Latin as *tres*, *tria* (in combinations sometimes as *trĕ*), in Sanskrit as *tri*, *trayas*, in Gothic *threis*, *thrya* and in other Aryan languages in cognate forms. But besides this we find in one of these languages, the Kurdish, a form *seh*, denoting 3. It has already been suggested that a numeral-word for 3 was of some such form. How this form of numeral-word came into being, the present writer finds it difficult to surmise; possibly a pronominal element (perhaps *xve*), represented in its latest form by *se*, may have been connected with the middle finger of the right hand and come into use as denoting the numeral.³⁷ The ordinal forms of this numeral, derived directly from the cardinal forms, in many cases resemble adjectives of quality in the superlative degree.

¶57. It will perhaps never be possible to say with any degree of certainty what were the original meanings of the first three numeral-words now in ordinary use. It has been surmised that the original force of the numeral-word *unus* (1) and its allied forms was that of a demonstrative pronoun, indicative probably of objects in close proximity to

³⁷ See note 42 to ¶58. Festus mentions the word *stritavus* instead of *tritavus*, a grandfather in the third degree, that is to say, the grandfather of a grandfather's grandfather. The occurrence of the initial *s* has not been accounted for. The stem-form *tri-* in *tritavus* is derivative from the root-form *ter* (¶57).

the speaker and equivalent in general meaning to "this," and there seems at present no opening for giving any other reasonable explanation.³⁸ So also it has been suggested that the numeral-word denoting 2 originally bore the meaning of "that." That a word of this nature may acquire a numerical signification is shown by the Latin *alter*, "second," and the German *ander* in *anderhalb*, "second half" ($1\frac{1}{2}$). Also it has been supposed that the numeral-word for 3, which was of later origin than the two preceding numeral-words, signified what was in excess of or "beyond" 2. Miss L. M. Bagge remarks with reference to the facts which she has collected on the subject: "These facts taken together may indicate that 'three' was formed some time after 'one' and 'two.' For these several words are employed because the very idea of 'one' and 'two' was only gradually arising. But by the time the word 'three' was coined the notion of numbers had become more fixed with the growth of the practice of counting, and so for one number only one word was employed. In the interval then that elapsed before 'three' was invented the original meaning of 'one' and 'two' might have faded, and the words have become stereotyped as numerals pure and simple. Therefore it would have been natural for the early Indo-European to say 'one,' 'two,' 'three,' whereas it is less easy, though perfectly possible to suppose, that he counted 'this,' 'that,' 'beyond,' just as an Englishman might say 'this,' 'that,' 'yon,' or a German 'dies,' 'das,' 'jenes.'" ³⁹ Professor Sayce, whilst refraining from any attempt to account for the first of the numeral-words, unreservedly remarks with regard to the next two of them: "In our own Aryan family

³⁸ C. L. Meader, *Latin Philology* (Macmillan & Co., New York, 1910, pp. 12, 13). The Greek form *heis*, if originally *sems*, may have meant "unity produced by conjunction."

³⁹ "The Early Numerals" in the *Classical Review* for June, 1906.

of speech there was a time when 'one' and 'two,' or that which was divided (*duo, dis, dia, etc.*) from 'one,' were the only two numerals, and it required a fresh effort of thought to attain and conceive of a fresh numeral, which accordingly was named *tri, tres*, 'three,' or that which is 'beyond' (*trans, 'through,'* Sanskrit *tarami*, 'to pass beyond'). The supposition that our primitive forefathers could not count further than 2 at an early stage of their development would be quite in accordance with our knowledge of the methods of counting amongst uncivilised races. There is supposed to be evidence also of the gradual evolution of the idea of number among the primitive Indo-Germanic people in the fact that several of the Indo-Germanic languages have a dual and plural as well as a singular number, and that there is reason to believe that the dual is older than the plural. It may be supposed that at first there existed only one form for both the singular and the plural, as is the case in respect of the word "sheep." Mankind, it is thus supposed, advanced to the conception of duality before he realised the idea of plurality.⁴⁰ As regards the third numeral, the philologist Brugmann countenances a theory that **ter* was a name for the middle finger. Those who are inclined to believe that these numeral-words would primarily have denoted concrete objects rather than abstract ideas may be inclined to accept this theory. The feature of the middle finger which is most striking and to which reference is made in the folk-lore of various peoples, when that folk-lore relates to the fingers, is the fact that it exceeds the others in length; on that account its name may possibly be connected with Sanskrit *tarami* "to pass beyond," "to exceed," and with

⁴⁰ Professor A. H. Sayce, *Science of Language*, Vol. i, p. 410. Some races at the present day have no distinction of singular and plural. *Kent*, it will have been observed, is supposed to have at first represented "hands" as well as "hand."

Latin *trans*—possibly originally the present participle of a verb having a similar meaning. In the same way, in Zulu the number 7 bears the name of the index finger, and the Bechuana, who begin their counting with the little finger, call their first ordinal *nthla*, with reference to the tip of that finger. Reverting to the subject of the meaning of the first two numeral-words as well as of the third, some have held that there existed a connection between these and the personal pronouns of the first, second and third persons respectively;⁴¹ but this theory seems no longer to be entertained. Besides the philological reasons advanced against it is the physiological one that these three pronouns (referring respectively to the speaker, the person spoken to and the person spoken of) would have been indicated by fingers of the right hand, whilst the three numeral-words would have been connected with the fingers of the left hand. We speak indeed of “ I ” and “ me ” as the first person; of “ thou ” and “ thee ” as the second and of “ he ” and “ him ” as the third, but as far as we know no actual connection between these personal pronouns and the first three numeral-words in ordinary use can definitely be traced. Yet it is possible to conceive of occasions when the fingers of the right hand have opportunely been used in the process of counting, notably in the case of the numbers from 6 to 10.⁴²

⁴¹ Lepsius, *Abhandlungen*; II. *Über den Ursprung und die Verwandtschaft der Zahlwörter*; Berlin, 1836, p. 88; Donaldson, *New Cratylus*, p. 24; Pott attacked this theory in his *Die Quinare und Vigesimal Zählmethode*, p. 130.

⁴² As has been suggested previously in the text, a pronominal element *se* may possibly have been connected with the middle finger of the right hand, and thus also with the numeral 3. Taking the Latin accusative forms *me*, *te*, *se*, which one might translate “ myself,” “ thyself,” “ himself,” one may imagine that a speaker at an early period would have signified the first by pointing the thumb of his right hand to and touching his breast, and the second by pointing his index finger to the person

¶58. Having had under discussion the numeral-words expressing digits, we now pass on to the words expressing numerals compounded of more than one digit in our decimal system, beginning with those above 10 but under 20. They are in Latin regularly as follows: (11) *undecim*, (12) *duodecim*, (13) *tredecim*, (14) *quatuordecim*, (15) *quindecim*, (16) *sedecim* or *sexdecim*, (17) *decem et septem*, (18) *decem et octo*, (19) *decem et novem* or *undeviginti*. Instead of the expressions here given as denoting the last three of these numerals one also meets with respectively *septendecim* (or *septemdecim*), *octodecim* and *novendecim* (or *novemdecim*) formed on the same analogy as the immediately preceding numeral-words, and on the other hand one also meets with *decem et tres* for 13 and *decem et sex* for 16, and possibly also similar formations may be found for 14 and 15; but in all such cases the formation is not the usual one. The reason why the prevalent usage in the case of 17, 18 and 19 was different from what it was in the words expressing the immediately preceding numerals may have been the natural effort to obtain greater clearness by avoiding a consecutive repetition of the word denoting 10, since that word already formed an ingredient in the numeral-words denoting 7, 8 and 9. Thus, if 7 was represented by *se-ap-dekent* and if the compound word representing 7 was placed before and in juxtaposition with that representing 10, the numeral 17 would have been represented by *se-ap-dekent-dekent*. As will be seen hereinafter, the peculiar formation in many languages of the numeral-words denoting 70, 80 and 90 were probably spoken to, leaving the middle for the third. *Me* and *te* represent some of the earliest sounds uttered by infantile lips and were, it seems, earlier in origin than their respective nominatives. *Se* has acquired no nominative. Perhaps further investigation may show also that the prefix *se-* and the conjunction *sed* arose from the idea of sejunction from the first and second persons jointly.

powerfully affected by similar considerations. In Welsh 16, 17, 18 and 19 are denoted by expressions respectively equivalent "one and fifteen," "two and fifteen," "three and fifteen" and "four and fifteen." This usage may have arisen from the practice of counting upon the fingers of both hands, then again upon the fingers of one hand and then starting afresh on the fingers of the other hand, but possibly a similar reason as that which has been here suggested for the case of the Latin numeral-words for 17, 18 and 19 may have affected the formation of these numeral-words in Welsh, which by way of analogy was followed in the case of 16 also.

¶59. In the case of 11 and 12 the Teutonic languages have peculiar forms, appearing in English as "eleven" and "twelve" respectively. As soon as men of the Teutonic race overcame the difficulty which has been already mentioned, to observe with some degree of accuracy the recurrence of the year and the phases of the moon during that period, they must have experienced the necessity of being able to express the two numerals beyond those comprised by the fingers of the two hands, in order to be able to count the full number of months in the year. These two numerals are supposed to have been expressed respectively by the words "one left" and "two left" or remaining over after the ten fingers had been counted.⁴³ In the classical languages no forms etymologically corresponding to "eleven"

⁴³ There can be but little doubt as to the correctness of this derivation; Gothic *leiban*, Greek *leipein*, Latin *linquere*, to "leave." That the Gothic *ainlif* and *twalif* should represent, as has been suggested, an original *ain-tak* and *twai-tak* (the syllable *tak* in either case representing 10), seems highly improbable. In the Lithuanian language the corresponding formation *wienolika*, *dwylika* has (possibly merely by way of analogy) been carried on up to, and inclusive of, 19.

and "twelve" are to be found. This fact would seem to indicate that at the time when the German race first established itself as a separate branch of the Aryan stock the year of twelve months was not generally known, and that in fact the members of that stock had not yet hit upon any fixed system of naming the numerals beyond the number of the fingers of both hands. It is, however, possible that the forms etymologically corresponding to "eleven" and "twelve" in the other languages may have fallen into disuse later, other numeral-words denoting 11 and 12 and made up of the words denoting 10 and the units 1 and 2 having meanwhile come into use. In Greek the forms of the words denoting 11 and 12, *hendeka* and *dōdeka*, respectively, in any case are very primitive as compared with the fuller forms for 13 and the six other numeral-words under 20, *triskaideka* and so on. In Rome Numa Pompilius is supposed to have introduced the year of twelve months; but the fact of the true year consisting of that number of months would probably have been known for a long period of time before it was formally recognised in the calendar. In Latin the ordinals of the two numerals 11 and 12, *undecimus* and *duodecimus* are simpler, and possibly therefore of earlier origin, than *tertius decimus*, "thirteenth," *quartus decimus*, "fourteenth" and so on. In any case such peculiarities of form as there may be of the numeral-words for 11 and 12 do not really afford any evidence, as has been supposed by some to have been the case, of any system of counting by tetrads ever having been in vogue amongst the people of the Indo-Germanic race.

¶60. The numeral-words expressing multiples of 10 under 100 may next be taken into consideration. The numeral-word for 10, when analysed, denotes, as has been pointed out in previous pages, simply "two hands." As one would naturally expect, the

words expressing these multiples of 10 denote "twain two-hands," "three two-hands" and so on. The typical form of the words denoting these multiples is found in the Lithuanian *dwi-de-szimt-i* (20) and *trys-de-szimt-is* (30) and the rest, where the former of these two numeral-words naturally assumed a dual, and the latter a plural, form. This language, it may again be remarked, exceeds all the other Indo-Germanic languages in the antiquity of the forms which in many cases it has preserved. In the classical languages the *de* has disappeared, as if one should say "thrice the hands" instead of "thrice two hands." In Latin *dvi-(de)-kent-i*, through the surrender of the initial *d* has become *viginti*. It has been sought to identify the first syllable of this numeral-word with a hypothetical root **ui*, supposed to denote apartness and hence unity; but, whatever objections may have been raised to its identity with *dui*, it seems much more probable that the Latin numeral-word was, in respect of its first syllable, formed in precisely the same manner as the Lithuanian, and, it may be added, also the English "twenty," in which the *tw* corresponds to the Lithuanian *du*. The Gipsy *bisz* (20) apparently requires to be referred to an original *du* as much as the Latin *bis* for *dvīs* and *bellum* for *duellum*, in the case of which an initial *d* has also disappeared. And the Latin prefix *ve-* is probably equivalent to and derived from *due*.⁴⁴ In Æolic

⁴⁴ Pott, *Die Quinare und Vigesimalē Zählmethode*, p 162 in *notis*. In the Latin of Roman rustics we seem to have a case of a similar loss of an initial *d* in the word *vervagere* (*vervegi*, *vervactum*), to "twifallow." It may be suggested that with a transposition of the letter *r*, such as frequently takes place, *vervagere* = *vefragere* = *dufra(n)gere* = (to coin a word) "to twi-break," that is to say, to plough or break up fallow land that has been ploughed once before. Compare Dutch *braken* from *braak* ("fallow land"), which again is derived from *breken* ("to break").

Greek *dui-(de)-kent-i*, with the loss of the initial *d* and the not infrequent change of *en* into *a* in the syllable *kent*, became $\Gamma ikati$ with an initial digamma. This numeral-word must be considered as a dual form, and the dropping of the initial *d* may to some extent have been due to the sense, after the word had acquired a dual form, that that initial, as indicating a prefix signifying duality, was no longer required. In Attic Greek the labial faded away as well, as the digamma in that dialect invariably did, but, to compensate for the loss, the first syllable of the word got lengthened; moreover the *en* changed (as also not infrequently happened) into *on*; this would have produced *eikonti*; this underwent a further change into *eikoti*; and, as the language was somewhat intolerant of the letter *t* between two vowels, the word became *eikosi*, which is the form which has actually been preserved to denote 20.⁴⁵ In Sanskrit a transformation of the like kind resulted in the representation of this numeral by *viṃṣati*.

¶61. The numeral-word for 30 in Latin is *triginta* (*tria-(de)kent-a*), the termination in *a* clearly indicating a neuter plural form, such a form having come into existence. Similarly in Greek we have *triakonta* (*tria-(de)kent-a*). The fact that in Latin the ordinal *vigesimus* (or *vicesimus*) is identical in formation with *trigesimus* (or *tricesimus*) and so also in Greek the ordinal formation of *eikostos* is identical with that of *triakostos*, brings out in a clear light the identity of structure of the numeral-words denoting 20 and 30 in these languages respectively. In accordance with the same principle as that on which *triakonta* was formed we find *tessarakonta*,

⁴⁵ The Æolic form seems to show that there is no occasion to suppose an original root-form *kmt* to have existed.

Latin *quadraginta* denoting 40.⁴⁶ Following the analogy of these formations in the next following multiple of 10 an *a* was inserted between the prefixed indeclinable digit and the termination *-konta* or *-ginta*, thus we have *pentēkonta* (*penteakonta*) and in analogy therewith *hexēkonta* (*hexeakonta*), and in Latin *quinginta* and *sexaginta* respectively for 50 and 60. Still following the same principle, and adopting for the numeral 8 the suggested older form, we should get *septem-a-ginta*, *octem-a-ginta* and *novem-a-ginta*. The forms actually in use within historic times were *septuaginta*, *octuaginta* and *nonaginta*; but these are clearly only a slight transformation of the forms given just before. (*Octoginta* also appears; this perhaps was directly derived from *octo*.) In Greek the corresponding forms for 70, 80 and 90 must have been *hepten-a-konta*, *octen-a-konta* and *ennefen-a-konta*. Apparently at a later time, when the numeral-words denoting 7, 8 and 9 had lost their primitive forms, it must have been supposed that these three numeral-words entering into the composition of the compound forms representing 70, 80 and 90 were ordinals, the insertion of an *ē* before *konta* being by analogy observed; hence the forms, which on any other supposition would appear to be not reasonably explicable, *hebdomēkonta*, *ogdoēkonta* and *ennenēkonta*. Here then, and to some extent also in Latin, the special formation of the numeral-words for 7, 8 and 9 is responsible for the clear divergence of form between respectively on the one hand the numeral-words for 60 and the lower multiples of 10 and on the other hand the numeral-words for 70, 80 and 90.

¶62. In Gothic the divergence is far greater. In

⁴⁶ As to the change of *t* in *quatuor* into *d* in *quadraginta* see Walde, *Lateinisches Etymologisches Wörterbuch*, s.v. *quadru-*.

that language the numeral-words expressing these multiples of 10 are as follows:

| | |
|-------------------|------------------|
| 20. Twai tigjus | 60. Saihs tigjus |
| 30. Threis tigjus | 70. Sibuntêhund |
| 40. Fidwôr tigjus | 80. Ahtautêhund |
| 50. Fimf tigjus | 90. Niuntêhund |

It will be perceived at a glance how very different the formation of the numeral-words denoting 70, 80 and 90 is from that of the numeral-words denoting the preceding multiples of 10, whilst it is similar to that of the numeral-word denoting 100 (*taihuntêhund*). This difference in structure may possibly be sufficiently accounted for in the following manner. Selecting for the purpose of comparison the words denoting 60 and 70, the more original forms of these would (in accordance with the origins already previously assigned to the numeral-words for 6 and 7) when analysed, give us:

60. Se-se-têhund ("six two-hands").
 70. Se-ap-têhund-têhund ("seven two-hands").

In the compound word denoting 60 a letter *s*, as a sign of the plural, at a later stage came to be suffixed to *têhund*, which then with its suffix was converted into and superseded by *tigjus*.⁴⁷ In a similar manner the numeral-words denoting the lower multiples of 10 were formed. But in the case of 70, and similarly also in the case of 80 and 90, the repetition of the word *têhund* seems to have had this effect, that this nearly original form of this word remained unaltered in its terminal position, even when, after the modification of the first *têhund*, the repetition was no longer obvious; the word being employed without the suffixed *s* as a sign of the plural, in the same manner as in the case of *taihun-*

⁴⁷ It must be remembered that here the letter *h* was in its origin a guttural.

têhund (100). If this be the correct explanation of the divergence of form between the numeral-words for 60 and the lower multiples of 10, on the one hand, and the other multiples of 10 up to 100, on the other hand, that divergence affords a corroboration of the origin previously attributed to the numeral-words denoting 7, 8 and 9. In any case the similarity of the terminations of the numeral-words for 7, 8 and 9 and the similarity just referred to in the case of the multiples of these numbers are sufficiently striking. In Icelandic too the numeral-words expressing 70, 80 and 90 are peculiarly formed, as distinguished from the lower multiples of 10; for instance, 80 is *áttracthr*, where *racthr*, in the singular seems to have meant a reckoning or counting, namely of the ten fingers of both hands, hence 10, in the same manner that in English the word "score" came to mean "twenty."

¶63. In the Dutch language 6 is *zes* and 60 is *zestig*, but, whilst 8 is *acht*, 80 is *tachtig*, with a prefixed *t*; similarly 7 is *seven*, and 9 is *negen*, but with some old people and in some dialects 70 is *tzeventig* and 90 is *tnegentig*, each also with a prefixed *t*. We find the prefixed *t* in these cases in the Old Saxon *antsibuntig* (Anglo-Saxon *hundscoufontig*), *antachtig* and *antniguntig* for 70, 80 and 90 respectively. (*Ant* is found as a dialectical variant of *hand*.) In these cases *ant*, corresponding to *hund* standing for *têhund*, may have been prefixed to avoid the consecutive repetition of that word, which, as shown in the last preceding paragraph, occurred in the original forms of these numeral-words, whilst *tig* came to be suffixed later by a false analogy with the lower multiples of 10.

¶64. In some other languages also there is noticeable a divergence between the forms used for the multiples of 10 below 70 and those used for that numeral and for 80 and 90, in this respect that in the

case of the former the decimal, and in the case of the latter the vigesimal, system of numeration is followed. This may possibly be as a reminiscence of the time when the reduplication already referred to was sought to be avoided, if not of a period when men counted with toes as well as with fingers. Thus in French, whilst *soixante* stands for 60, we find *soixante-dix* for 70, *quatre-vingt* for 80 and the cumbrous *quatre-vingt-dix* for 90. This formation is possibly due to Celtic influences. In Danish it appears that quite a different arrangement prevails; an idea of which may be gathered from the following:

40. *Fyrretyve*.

50. *Halvtredsindstyve* (half-three times 20) appearing also in an abbreviated form as *halvtreds*.

60. *Tredsindstyve* (3×20) abbreviated into *treds*.

70. *Halvfjerdindstyve* (half-four times 20) abbreviated into *halvfjerd*.

80. *Firsindstyve* (4×20) abbreviated into *fird*.

90. *Halvfemsindstyve* (half-five times 20) abbreviated into *halvfems*.

In the case of 40 *tyve*, like the Gothic *tigjus*, stands for 10. In the case of the other numerals here mentioned it stands for 20, as Pott suggests, like the Gothic *twai-tigjus*; at any rate *sinds* is equivalent to the English "times" and in each case *sindstyve*, with or without a letter *d* prefixed, multiplies the preceding portion of the numeral-word by 20. The principle followed in the case of the forms given for 50, 70 and 90 (*halvtredsindstyve*, etc.) may be compared with the usage in Dutch and some other languages in which half-past two o'clock is expressed by saying "half three o'clock," half-past three o'clock by saying "half four o'clock" and so on, or such expressions as Latin *semistertius*, Old English *thridde half*, Dutch *derdehalf*, for $2\frac{1}{2}$. However the forms *femti* (50), *sexti* (60), *sytti* (70), *otti* (80) and *nytti* (90) also appear to be sometimes

used. With regard to the Danish numeral-words founded on the vigesimal system of numeration, it must be admitted that here the explanation fails which has been given for the divergence of the forms representing 70, 80 and 90 from the forms representing the lower numerals of 10 in the case of some other languages, since in the present instance the forms for 50 and 60 also depart from the decimal system; but possibly in the case of the last-mentioned two numerals the analogy of the higher numeral-words has simply been followed. In English the word "score" is in biblical language often introduced in denoting the higher multiples of 10 under 100, for instance in the expression "three score and ten" for 70.

¶65. The peculiar formation then in several languages of the numeral-words denoting 70, 80 and 90, as contrasted with those denoting the lower multiples of 10, appears thus to be sufficiently explicable without recourse being had to the conjecture of an early intercourse between the Indo-Germanic stock and Babylonia with its sexagesimal system of numeration.⁴⁸ It is in fact difficult to see how such intercourse, even if it had existed, could have had the effect that in the Indo-Germanic languages not a uniform but diverse systems of numeration should have been followed in the formation of the numeral-words for 70, 80 and 90, as distinguished from the formation of the lower multiples of 10.

¶66. We may now proceed to discuss the numeral-words used to denote 100 and its multiples under 1,000. The numeral 100 we should naturally expect to be represented by a form of words meaning "ten

⁴⁸This conjecture is made by O. Schrader, *Sprachvergleichung und Urgeschichte* (Jena, 1906), Vol. i, p. 106; Vol. ii, p. 292, *in notis*.

tens." In Latin, to represent the matter in its simplest form, (*de*)cent-(*de*)cent became *centum*,⁴⁹ the syllable *de*, meaning "two" being understood, as in the case of *triginta* for *tria-dekenta*, or as *tai* (for *twai*) is understood in the case of the Gothic *hund* (§68), and the second guttural falling away, as in several cases previously mentioned, whilst the final *t* is lost as in the case of *decem*. *Centum* may thus be said to be equal to *decem(t)-decim* (10×10). *Ducenti* is 200, *trecenti* is 300 and *sexcenti* is 600. In the case of these numeral-words the formation is obvious. The elements composing these at first sight appear to be the same as the elements composing *viginti* (20) *triginta* (30) and *sexaginta* (60), but, as *centum* is a reduplicated form these words really stand for $2 \times 10 \times 10$, $3 \times 10 \times 10$ and $6 \times 10 \times 10$ respectively. The numeral-words for 500, 700, 800 and 900 respectively are *quingenti*, *septingenti*, *octingenti* and *nongenti* for *quinquegenti*, *septemgenti*, *octemgenti* and *novemgenti*. In these cases we have a *g* following an *n*, probably as matter of euphony. The form for 400, *quadringenti* seems difficult to account for, unless we suppose it was affected by the next succeeding numeral-words of similar form. The similarity of the elements going to make the multiples of 10 and 100 respectively in Latin usually occasions much difficulty to beginners of the study of that language; for instance in the case of *quadrageni* (40 each) and *quadringeni* (400 each). It will be seen that in each of the Latin expressions denoting 700, 800 and 900 the equivalent of the words "two-hands" are three times successively repeated; for instance, an analysis of the numeral-word signifying 700 gives us *se-ap-*

⁴⁹ According to Brugmann, who has anticipated the present writer in showing that the Latin *centum* is a reduplicated form, *d̥k̥mt—*d̥k̥omt=*d̥k̥mt—(*d̥k̥)om(t)=*d̥k̥mtom=*k̥mtom=*centum*. But the initial letter *d* represents a distinct word meaning "two." No plural forms existed as yet.

dekent-dekent-dekent. Cannot it be that at some very early period the involved construction of these numeral-words had among the ancestors of the Romans debarred these numerals from general use, with the effect of limiting numeration at that time to the number 600, and that accordingly the word expressing the last-mentioned numeral came to be regarded by them as the ultimate multiple of 100? For we find that even up to classical times the word for 600, *sexcenti*, was still used as an equivalent expression for "a very great number," in very much the same way as in Greek the word denoting 1,000 was, with perhaps a slight change of accent, used in that sense.⁵⁰ If the surmise here made be well-founded, it will be perceived that the curious fact here referred to may perhaps be accounted for in a manner similar to that in which the strange facts already mentioned as relating to the numeral-words denoting 70, 80 and 90, and to some extent to those denoting 17, 18 and 19 in Latin, have been sought to be accounted for in preceding pages.

¶67. In Greek the equivalent for the Latin *centum*, with the prefix *hen* (1), abbreviated into *he*, and with an ordinary change of an unaccented *en* in the second syllable into *a*, produced *hekaton* as the numeral-word expressing "one hundred." In the case of the numeral-words expressing multiples of 100 under 1,000 a similar change of *en* into *a* took place in the Doric dialect, hence the termination of these words in *-katioi* in that dialect. In Attic Greek, however, we find the termination *-kosioi* for *-kotioi* (in conformity with an ordinary rule by which *t* between two vowels is changed into *s*), which again stands for *-kontioi* and a more original *-kentioi*; the change of *en* into *on* in Attic Greek not

⁵⁰ Pott, *Die Quinare und Vigesimal Zählmethode*, p. 141 in *notis*.

being infrequent. The neuter plural form of *tria-* in the Greek numeral expression for 300 is not easily explicable, unless we hold that this expression is formed on the analogy of *triakonta* (30). In Sanskrit the equivalent of *centum* is *çata*; the form *daçati* seems also to be met with, formed on the analogy of the numeral-words expressing the preceding multiples of 10 and standing for *daça-daçati* like the Gothic *taihun-taihund*. The numeral-word in Sanskrit for 200 is *dve çati* or *dviçata*, and so on with the other multiples of 100.

¶68. In Gothic the full and more original form of the numeral-word expressing 100 appears as *taihun-taihund*, but only in speaking of a single hundred. Otherwise the ordinary form is *hund*, which apparently was merely a convenient abbreviation of the full expression. In Anglo-Saxon we meet with *hund* but also with *hundteontig* and the later *hundred*. In the case of *hundteontig* (*hund-tehundertig*) the syllable *tig* was redundantly suffixed (¶63); in the case of *hundred* the syllable *red* corresponds to the Icelandic *raethr* (¶62), and the word seems to have been more specially of Scandinavian origin.⁵¹ In Icelandic the same termination is also found in the case of *thushundrad* (1,000). It is a curious fact that amongst some of the Germanic races *hund* acquired also the meaning of 120 and consequently also *thushund* (etymologically equivalent to "thousand") that of 1,200. The explanation of this fact may possibly be suggested to be that by confusion of ideas in dealing (for men who had attained no very high degree of intellectual development) with so large and complex a number the meaning of *tvalif-taihund* was attached to *t(w)aihun-taihund* and eventually to the simple form *hund*. For forms are to be met with which are equivalent

⁵¹ Some suppose the word *hundred* to have been formed like the Latin *centuriatus*.

to what in English would be expressed as "twelvety" (12×10), formed in the same way "twenty," "thirty" and the other multiples of 10 under 100; thus in Anglo-Saxon we meet with *hundtwelftig* (*hund twelftig*).⁵² •

¶69. It is generally supposed that when the various sub-divisions of the Indo-Germanic race as they now are known, diverged from each other, they already had a common numeral-word to express 100, whilst they apparently had not one yet in common use to express 1,000. It does indeed seem that they had such a common term for 100 and that in the pre-Christian period amongst the Teutonic races some confusion, referred to in the last preceding paragraph, arose as to its meaning; but it need not necessarily have been the case that such a term existed in common; for the word expressing 100 may in separate cases have been formed independently but upon the same natural principle. Be this as it may, the reduplicated form which this word originally presented implied a knowledge of a fairly advanced degree of the science of multiplication, whilst forms like "six" and "sixteen" only implied a knowledge of addition. It is possible, however, that a word denoting 100 came into being before there existed words denoting lower multiples of 10, since there is some diversity in the manner of formation of these lower multiples and moreover in their case plural forms are often to be observed, which is not the case with the numeral-word for 100. There was, in any case, when the numeral-word for 100 came into

⁵² In the Malberg glosses, in which the spelling is in many cases somewhat erratic, *tholoasti*, 120, apparently for *tholoasti* ("twelvety") is met with. Similarly *thewalt chunna*, probably for *theuwalf chunna*, denoting 1,200 (12×100). *Chunna*, by the way, suggests the guttural sound of the initial letter of *hund*.

being, a considerable advance beyond the state of the mere savage, though plural forms were possibly then not yet in use.

¶70. The numeral-words expressing 1,000 will now be brought under discussion. In Iceland it is *thushund*; but, with the addition of the suffix *rad*, as in the case of *hund*, *hundrad* (100), the form *thushundrad* is also employed. The only possible meaning of the first syllable of *thushund* is 10. In Gothic we also find *thushundi*. In these numeral-words the first syllable must bear the same meaning, with the same original signification of "two hands," as the form *tigjus* (10) to which reference has already been made in the discussion of the Gothic numeral-words for the multiples of 10 from 20 to 60, both inclusive. It seems clearly to be a contracted form of *tehunds*.⁵³ The letter *s* appearing in the numeral word under discussion may be accounted for by the fact that at the time it came into being plural forms were in use. The same elements seem to appear in the Lithuanian numeral-word for 1,000, *tukstantis*, if we are right in the surmise that this was a numeral-word borrowed from a Germanic source. (*Tuks-tant-is=Tigjus-tehund-is*.)⁵⁴ In the other Aryan non-Teutonic languages the formation of the words denoting this number is not very easily to be accounted for. One of the Hungarian Gipsy numeral-words for

⁵³ In spite of all possible objections it seems incredible that it could be otherwise. To connect the first syllable of *thushund* with, for instance, a root *tus*, "strong," and to suppose that men would have spoken of a "strong hundred," whereas they would naturally have said "ten hundred," seems really to go beyond the bounds of common sense. Yet this suggestion has been made. It may here be repeated that the letter *h* in *tehund* was really a guttural.

⁵⁴ In the same way as the Sechuana borrowed *thausanta* (1,000) from an English source.

1,000 is *ekhezeros*, of which the first syllable may be a form of the first numeral-word in that language, *jek*, Sanskrit *eka*, and which may possibly be connected with the Sanskrit words meaning "one" and "thousand," *eka* and *sahasra*. In the case of *sahasra*, the syllable *sa-* has been supposed to represent the root-form **sem*, also denoting unity and found in the Latin *simplex*; whilst the rest of the word has been supposed to be etymologically an equivalent of the Attic Greek *chilioi*, Lesbian *chellioi*. Also the Latin numeral-word for 1,000, *mille*, has been conjectured to be connected with the same Greek word and to stand for *mi-hille*, of which the earlier form would have been **smi-ghsli*, the Latin language not tolerating an *s* before the letters *l* or *m*. The first syllable *mi* would in this case correspond to the Greek *mia*, which has been surmised to have originally been *smia*. These conjectures, however, seem somewhat problematical. If they be in accordance with the real facts of the matter, a word represented by the Greek *chilioi* denoting 1,000 must have been in existence already before the Hellenic, Italic and Sanskrit-speaking peoples of the Indo-Germanic stock separated from each other. When the Teutonic section diverged from the others either no word or no such word was as yet in use; or if it had been in use it must have fallen out of use among them, but this last supposition seems to be the less likely of the two. In the Hungarian Gipsy language the form *desvarszel* co-exists with *ekhezeros*, besides a third form of Slavonic origin *t'isico*.

¶71. The word denoting 10,000 in Greek is *murioi*, which, however, also means "numberless," no difference of accentuation, it would appear, distinguishing the words in manuscripts in respect of its two different meanings. The latter meaning was probably the original one. Savages in a low state of development in some cases call everything

beyond two or three "innumerable" or "a large number"; and it has even been suggested that the English word "three" simply meant "beyond," that is to say, the number beyond 2. The word *murioi* as a numeral-word may have originated in the same manner; first denoting an indefinite number and then a definite large number. In most other languages 10,000 is simply expressed by a combination of the numeral-words denoting 10 and 1,000. The English word "million" is one derived from the Latin word *mille* (1,000), and "billion," "trillion" and so on have been formed on the analogy of "million." This last word is taken to mean 1,000,000. The numerical value of the multiples of a million is in England not the same as in France; so that, for instance, in the former country a "billion" means a million millions; in the latter it means a thousand millions. A universally accepted value ought to be established by some sort of a general convention. The difference in meaning testifies to the comparatively late origin of these words.

¶72. Some remarks may be added on the words expressing fractions in some of the Teutonic languages and in Latin. In the last-named language in the expression for "half" *dimidius*, the prefix *di-* denoted separation or division, whilst the root *med* or *mid* is also found in the English *mid* and *middle*; that which is divided in the middle being of course divided into two halves.⁵⁵ As regards *semi-*, however strong the temptation may be to seek its derivation from the same root, as if the word had originally been *semid*, that is to say, *mid* with a particle denoting sejunction (as *se-* does), the final letter *d* being dropped, as frequently happened in

⁵⁵ Hence the word "moiety" (Latin *medietas*) for a half.

Latin, it would perhaps be too much to say that such a derivation could be well supported. As regards the English word "half" (Anglo-Saxon *healf*) it would seem to have originally meant "side"; with a change of meaning that would not be difficult to account for, it came to be used to denote only one part out of two equal parts of a whole, except in such combination as "behalf." It is perhaps not too venturesome to suggest that the origin of the word "half" may be found in *hand-lif*, that is to say, that part of the human body (Anglo-Saxon *lif*, Dutch *lijf*) where the hand is placed to distinguish it from the front and back. The formation of the word would thus be analogous to that of the word "self," of which the first half is akin to the Latin *se*, so that the word "self" really represents the idea of "one's own body." (Compare the words "somebody," "anybody," "nobody" and "everybody.")⁵⁶ The close connection between the idea of "hand" and of "side" is shown by the identity of meaning of such expressions as "on every hand" and "on every side." *Handlif* then relates to a side of the body; two of such body-sides or halves from the whole. In Latin the method that was in vogue for expressing the commoner fractions other than $\frac{1}{2}$ was by means of the subdivision of the *as* into twelve *unciae*. This division was perhaps originally founded upon the relation of the changes of the moon to the annual rotation of the earth round the sun; possibly, however, upon the fact that twelve thumb-breadths make up the

⁵⁶ In Dutch *behalve* means "besides." In that language the word *half* has not the monosyllabic sound that it has in English, in fact, in old writings it is sometimes met with in the form *hallef*. The letter *d* falls away before another consonant in the Dutch *thans* for *te hands*. In that language too we find *voorlijf*, "forebody," and *achterlijf* or "hindbody"; so that one might almost expect to have *handlijf* for the "sidebody" or "side."

measure of length known as a foot.⁵⁷ These fractions were as follows:

| | |
|--|---|
| $\frac{1}{12}$ Uncia | $\frac{7}{12}$ Septunx (septem unciaë) |
| $\frac{1}{6}$ Sextans | $\frac{2}{3}$ Bes (dves; duæ [partes] assis) |
| $\frac{1}{4}$ Quadrans | $\frac{3}{4}$ Dodrans (de-quadrans) |
| $\frac{1}{3}$ Triens | $\frac{5}{6}$ Dextans (de-sextans) |
| $\frac{5}{12}$ Quincunx (quinque unciaë) | $\frac{1}{12}$ Deunx (de-uncia) |
| $\frac{1}{2}$ Semis | $\frac{1}{8}$ Octans, sescunx or sesquunx (sesqui unciaë) |

Other simple fractions were in Latin expressed by the ordinals, with *pars* expressed or understood, as *decima* or *decuma*, "one-tenth." The expression for complex fractions like *semistertius* ($2\frac{1}{2}$) and *semisquartus* ($3\frac{1}{2}$) are no doubt derived from the practice of counting on the fingers. For instance, to represent $2\frac{1}{2}$, three fingers would have been employed by the speaker, and whilst the first two fingers would represent integers, he would have said of the remaining finger that "the third (finger) is a half." Similarly in Dutch $2\frac{1}{2}$ is spoken of as *derdehalf*, Anglo-Saxon *thridde healf*. From the diverse ways of forming the fractions in various languages one may conjecture that the idea of arithmetical fractions was in quite an undeveloped state as yet when the several sub-divisions of the Aryan race, as we now know of them, separated from each other.

¶73. According to the views which have been presented to the reader of these pages, the first ten numeral-words may, in respect of their etymology,

⁵⁷ The Dutch word *duim* means "thumb," but also "inch," just as in English the word "nail" denotes a measure of length. The Latin *uncia* (*unx*) is usually derived from *unus*. But as a rule some concrete object is the basis of measurement. May not *unx* have represented the *latitudo pollicaris* or thumb-breadth of perhaps been allied to the Greek *onyx* or to the diminutive Latin form *ungula*, a "nail"?

be represented in mathematical form and as regards their meaning in the following manner :

- | | |
|--------------------------|------------------------|
| 1. This | 6. Three-three |
| 2. That | 7. Three off two-hands |
| 3. Yon | 8. Two off two-hands |
| 4. (Whole) hand less one | 9. One off two-hands |
| 5. Whole hand | 10. Two hands |

The succeeding numeral-words are of course, with but few exceptions (such as *mille* and *murioi*) compound words made up of the first ten numeral-words, as factors in multiplication, or by way of addition or subtraction, for instance :

| | |
|--------------------------|---------------------------------|
| 13 = 3 + 10 | three ten |
| 19 = 9 + 10 or 1 from 20 | nine ten ; <i>undeviginti</i> |
| 18 = 8 + 10 or 2 from 20 | eight ten ; <i>duodeviginti</i> |
| 30 = 3 × 10 | three tens |
| 33 = 3 × 10 + 3 . . . | three tens three |

In the case of the numeral-words for 1 and 2 their meaning can only be conjectured on somewhat insufficient data; in the language of barbarous races also it is not easy to arrive at their meaning. In the case of the numeral-word for 3 there is nothing in the language of such races inconsistent with the meaning which has been attributed to it above. In the case of the other numerals up to and inclusive of 10, if the words denoting them are of human origin at all, there can hardly be any account of their origin that is more likely than that which has been given in these pages, and it is moreover quite in conformity with our knowledge of the origin in those languages in the case of which the original meanings of these words can be traced. It may now be added that the word "cipher" for 0 is derived from the Arabic *sifr*, from which also through the Italian *zefiro* we get the word "zero," clearly showing the source and the comparatively late origin of the idea of "nought" in numeration.

CHAPTER VII

THE REPRESENTATION OF NUMERAL-WORDS BY FIGURES

¶74. UNCIVILISED races frequently make use of pebbles and other small objects for the purpose of calculation when they have advanced beyond the stage at which they can count no higher than the number of their fingers and toes together. A similar practice must have prevailed in early times among the Greeks and Romans, for a word in use with the former for calculating was *psephisein*, which is derived from *psephos*, "a pebble," whilst the Latin *calculator* is derived from *calculus*, which bore a similar meaning. More civilised races improved upon this method by placing a number of perforated beads upon parallel strings in a frame; with this simple instrument easy sums in addition and other arithmetical processes of a not very intricate nature could be performed. But to the higher flights of arithmetical calculation it was not possible to attain before a method of representing the numerals by figures had been discovered.

¶75. It is easily conceivable that oftentimes the desire to have a more or less permanent record of the number of a definite set of things or persons would have been felt even by uncivilised man. The manner of record which would most naturally suggest itself to his mind and which is still much practised by such peoples, would be to make for

every unit a stroke or notch on some material or other, in such a way as to remain legible for a considerable length of time. From a practice of this kind is derived the English word "score," the units being denoted by strokes or cuts, but every twentieth of these (equal to the number of fingers and toes together) by a deeper notch or score. This affords an illustration of the way in which a word denoting a concrete object may come in course of time to indicate a number in language. Also in the picture-writing of the North American Indians a single stroke denoted 1 and every additional stroke an additional 1. The ancient Assyrians, Egyptians and other races of olden time had similar systems of notation, which they improved upon by having distinct representations of 10 and of its multiples. The Greeks generally availed themselves of the letters of their alphabet; and that their practice in this matter extended far back is proved by the fact that several characters which formerly formed part of their ordinary alphabet, whilst they ceased thereafter to be employed as letters, remained in use as figures, to denote certain numbers in their proper order. The Romans also denoted the first four numerals by the appropriate number of strokes; for 5 they employed V evidently standing for the open hand held up, and for 10 they made use of X, representing probably the two hands crossed. The number 100 was represented by C, which probably was merely an adaptation of a figure denoting that number and consisting of a circle with a horizontal line drawn from one side of the circumference to the other, but which at the same time was the initial letter of *centum*, 100. For 1,000 they used at first a figure consisting of a circle divided by a perpendicular stroke and now still sometimes appearing in the form C|D; but this was generally superseded by the letter M, which bore some resemblance to that form and at the same time was the initial letter of *mille*,

1,000. The letter D, which forms one half of the figure which represented 1,000 was used for 500. The letter L, which represented 50, was probably an adaptation of a letter of an ancient Chalcidian alphabet, as possibly also was the case with the representations of 100 and 1,000. The simple forms I, V and X were probably in use even before the Romans had acquired an alphabet of their own.

¶76. The great defect of all these various methods of representing numbers to the eye was that they had no separate figure for nought (0). Without the use of such a figure it was not possible conveniently to carry out highly intricate numerical calculations; although it is surprising to what a degree of excellence the Egyptians and some others of the ancient nations brought their mathematical and astronomical knowledge without its use. The invention of the figure 0 was one of the most notable achievements of the human mind; one which has rendered possible those remarkable developments of intellectual activity in the sphere of mathematical science which distinguish the present day. That invention was due to the genius of an Indian race, though at what time and at what place it was made has not yet been determined.

¶77. The ten numeral figures were introduced into Europe at some time not later than the twelfth century by the Arabs, who in their trade with India obtained them from that country between the middle and the end of the eighth century. The first three numerals were at first simply represented by horizontal strokes — = ≡, the double and triple strokes being afterwards joined by cross strokes producing roughly the figures 2 and 3. The figure 0 is probably merely a representation of a vacant enclosed space signifying "nothing"; the other figures are possibly merely forms of the initial letters of words denoting the numbers for which

the figures stand. It is only in the fifteenth and sixteenth century that, owing to the convenience of the use of these figures as compared with the cumbrous ones which theretofore had been in use and in which a figure representing "nought" was absent, they came to be universally adopted in Europe as the ordinary method for indicating the numeral-words. Their use has now been extended throughout the civilised world; and one advantage of that universal use is that in whatever language a number denoted by a certain figure or combination of figures may be mentioned the symbol is at once understood by everyone, whether he understands that language or not.⁵⁸

⁵⁸ For further information on the subject of the numeral figures see the article on "Numerals" in the *Encyclopædia Britannica*, and a communication to "The Academy" of 28th January, 1882, by Canon Taylor, who also deals with the subject in his work on the Alphabet. Gibbon in his *History of the Decline and Fall of the Roman Empire* (Chap. lii., footnote 6), mentions a writer who maintained that our cyphers were used by Greek and Latin arithmeticians long before the age of Boethius (A.D. 500), and that after the extinction of science in the West they were adopted by the Arabic versions from the original manuscripts and *restored* to the Latins about the eleventh century.

CHAPTER VIII

THE USE AND ADVANTAGE OF NUMERAL-WORDS AND FIGURES

¶78. NOTHING perhaps has contributed in a greater degree to the elevation of the human race from a stage of low intellectual existence than the ability which man acquired to give expression to number, first in words and then in figures. Had he not been able to do so commerce on an extensive scale would have been impossible and science almost at a standstill.

¶79. Through the variety of man's requirements barter must have commenced very early in the history of the races of mankind. But there could have been only little, if any, barter so long as man could not express at least the lowest numerals in words. Though the possibility of barter without the use of the higher numeral-words would not have been excluded, yet without them great difficulties would have been experienced in engaging therein amongst a barbarous race, as is shown by Francis Galton's account of his business transactions with a Damara to which reference has already been made. It hardly requires any showing how immense would have been the gain to primitive commerce when words denoting the higher numerals came into being; we may conclude that in proportion as men could count to higher numbers so also were they given to a higher degree of commercial intercourse

and removed from the stage of a mere exchanging of skins and slaves for wine—such as we read of in Homer's Iliad.

¶80. The hand with its fingers, the foot and the small objects of various kinds, with all of which men counted, also provided them with convenient measures of length and of weight. To this fact testify the Roman "digit," the "thumb-breadth" (*latitudo pollicaris*; Dutch *duim*), the "palm" and (in measuring horses) the "hand," the "span," the "foot," the "pace," the "ell," the "cubit," the "barley corn," the "grain," the "scruple" etc.⁵⁹ Some of the utensils of which he made use probably, supplied him with measures of capacity, like the Roman *amphora* and possibly the "handful" as a measure was not unknown. And it was with the application of number to these measures of various kinds that the greatest strides must have been made in the progress of commercial intercourse amongst men. In the Scriptural account of the purchase by Abraham of the field of Ephron we learn that he weighed down four hundred shekels of silver, current with the merchant, and so this account tells us of an early period when there were men whose recognised profession it was to engage in commerce as merchants, when silver of a standard quality was in use amongst them, and when men could acquire by purchase and hold in possession an extent of land probably defined in measurement by means of numeral-words. When Joseph was sold by his brethren to a company of Ishmaelites coming from Gilead with camels laden with spicery and balm and myrrh, we find already

⁵⁹ The distance to which the voice carried has occasionally been accepted as a measure of distance (Pott, *Die Quinare und Vigesimale Zählmethode*, p. 2). Compare Homer's *Odyssey* iii. 400, and the expression "a far cry" in English.

then the Arabian trader carrying on commerce with the Egyptians and these paying the sellers in silver. And perhaps even thousands of years before the time of Abraham trade had been carried on by those ancient peoples of Babylon and Egypt, whose literary treasures have of late years been brought to light so extensively. For they had a complete system of numeral-words, they had methods to denote these and they had their measures of length, capacity and weight.

¶81. When the compound numeral-words had been conceived and brought into use, a process of simplification of the same took place, in accordance with the nature of language. Such simplified forms were naturally more convenient to use in the transactions of daily life than the older unsimplified forms, and must have had an important influence in assisting the development of commercial transactions amongst men. The preference for simpler forms is exemplified by the word which the Bechuana now use for 1,000, *thausanta*, instead of their own cumbrous expression for that number. And here attention may be drawn to the practical common sense shown by the speakers of the English language in almost completely discarding such forms as, for instance, "one and twenty" and "six and thirty" in favour of the simpler numeral-words "twenty-one" and "thirty-six." In this matter they are a step in advance of the other Teutonic peoples. The inconvenience of the longer forms is felt, for instance, in dictating such a number as 936 to a writer. When the words "nine hundred" have been uttered and, in using the longer form, the word "six" follows, with a slight interval before the words "and thirty" are uttered, the person addressed is apt to take down the figure 6 after the figure 9, whereas of course the figure 3 ought to follow the figure 9. To some extent an inconvenience of this kind is experienced in the case

of the English numeral-words " eleven," " twelve," " thirteen " and the other " -teens," words which might more conveniently and suitably be expressed as " teen-one," " teen-two," " teen-three " and so on, especially as such forms as " thirty " and " thirteen," or " fifty " and " fifteen " are so easily confused.⁶⁰

¶82. As there has been progress in the methods of counting, so also has there been an enormous advance in the methods of visibly representing numbers. The climax came when the clumsy strokes and figures of earlier times were superseded by the figures now in use. It need hardly be stated what a tremendous impetus to trade they have given. And in this connection it may be remarked that it seems surprising that the English people should not yet have seen the advantage of a system of coinage, weights and measures that is founded upon the fact that man has ten fingers to count with and the decimal notation that has been made possible through the invention of the numeral-figures and especially amongst them of the figure 0. A different system must always to some extent be a bar in the path of progress. Some account it almost sacrilege to do away with the present English system of measures, which they hold to be of divine origin, as if Providence, which has given each of us ten fingers, would have devised for human use a system that is cumbrous and irrational in itself and at variance with the natural way of counting.

¶83. Practical science depends for its very existence upon the expression of number by word and by figure. The astronomer, for instance, could not follow the sun and the moon and the planets in

⁶⁰ Since the above was written the present writer has found a somewhat similar suggestion in Mr Wells' book *Mankind in the Making*, p. 65.

their courses and accurately lay down their periods and orbits were it not that he could express and graphically represent number. Without the numeral-figures he could not place his calculations at the service of the seaman, to assist the latter in guiding his ship across the ocean. He is able to lay down the distances of the stars in numbers of appalling magnitude. In other branches of science the infinitesimally small can also be expressed in terms of number. And so the expression of number has attained to an exalted height, of which the human mind, when man first began the practice of counting upon his fingers, could not have formed the remotest conception.

CHAPTER IX

DERIVATION OF OTHER WORDS FROM THE NUMERAL-WORDS

¶84. WHEN once the names of the numerals were established in the language of any of the various peoples of the Aryan stock, these words themselves became the source from which other words were derived, through change of meaning or by composition. Often these numeral-words were in the process of derivation changed beyond recognition, and often too the meaning of the words into which they have entered is such that the numeral-words themselves would give no clue to their derivation. To the ideas conveyed by these new words it had probably very often not been possible to give expression before these words were evolved from the numeral-words. The evolution of such words, of which there are hundreds, and possibly many hundreds, during a comparatively recent period, illustrates the development of words in language from rude beginnings in the distant past to words of higher significance in the present.

¶85. In English the articles "an" and "a" are but forms of the first numeral-word, and in German *ein* expresses both the indefinite article and the numeral. The numeral is often used pronominally and in other ways, as when "one" speaks of

“some one” or of “little ones” in the plural or says “it is all one to me.” From the same numeral-word as root we have “any,” “only,” “none,” “oneness,” “onesidedness,” “once” and so on; perhaps “alone” and “lone.” From “onement,” an old English compound of “one” signifying “concord” or “agreement” we get “atoning” and “atonement.” The word “nonce” takes its initial letter from a preceding definite article in a formerly declined oblique case in the expression “for than anes,” “for the nonce.” “Anon” has the meaning of “in one (moment),” like “at once.” From the Latin numeral-word for 1 we have a number of other words such as “unit,” “unite,” “union,” “unity,” “unitarian,” “unique,” also “null” (*nullus*; *ne-unu-lus*) and *universus*, “turned into one” and hence “universe,” “universal,” “universality” and “university”—a place where all branches of learning are taught. From the root *sem* we have such words as “simplicity” and “singularity.” From the Greek word for 1 we have the termination *hen* in “hyphen” and from the Greek words for 1 and 2 both we get “hendiadys.”

¶86. The Latin word *duo* signifying 2 becomes in English a song in two parts; so also we have the musical term “duet.” Words signifying “two” also enter into the composition of others denoting duplication, literal or metaphorical, such as “twain,” “twin,” “twice,” “twofold,” “double,” “deuce,” “dissyllable,” “bigamy” and “duplicity.” So “biscuit” means a cake that has been twice baked (German *zweiback*); “bicycle” a machine with two wheels. So also “diptych” was originally a double-folding writing tablet, but later meant a register of Christian saints, bishops and martyrs; and a “diploma” was composed of two bronze tablets folded together, containing a copy of the law relating to privileges granted to veteran soldiers

by Roman Emperors followed by the name of the individual soldier to whom they were granted; hence any document conferring some privilege, power or authority, whilst a "diplomat" is an envoy who carries his credentials in a document of this kind, and "diplomacy" is the art of such an envoy. So likewise to "twifallow" (Latin *vervagere*, hereinbefore suggested to have originally been *due-frangere*) is to plough land a second time after it has lain fallow since a previous ploughing. Words signifying the numeral 2 also form parts of words denoting the formation of a thing out of two or more, such as "twine," "twist" and "combination"; or of words denoting a separation of a thing into two, as in the case of "bisect" and "bifurcate," whilst there is a somewhat similar formation from the numeral in the case of words having the Latin prefix *di-* and *dis-* ("atwo"). In Old English there was a similar prefix *to* in *to-rente*, "rent in twain" and *to-burst* "burst in twain." To the class of such prefixes also belong the Greek *dia-* and possibly also the Latin *ambi-*, Greek *amphi-*. From the numeral-word for 2 we also get words denoting an intermediate state or an uncertainty between two conditions, for instance, "between," "betwixt," "tweenie," "twilight," "dubious," "doubt" (Anglo-Saxon *tweonian*, "to doubt"; German *zweifel*, Dutch *twijfel*), whilst from *dubitare* "to doubt" again we have "indubitable" and "redoubtable," the meaning of this last word originally having been "to be regarded with doubt and fear." Moreover from this numeral-word are derived words denoting conflict between two or more, such as "duel," "bellicose"; so in Dutch one has *twist* and in German *zwist*, "quarrel." The Greek ordinal form we meet with in "Deuteronomy," the book containing the second giving of the Law by Moses, and "deutoxide" a compound of two elements of oxygen and one of a base. From the Latin ordinal

we have the word "second," used in various senses, both as a noun and a verb.⁶¹

¶87. We may recognise in a good many words the numeral-word for 3 or its equivalent in the classical languages. "Trice" appears to be the short space of time in which one can count three; "trio" is a musical composition for three performers; "trias" a geological group of three formations. "Tripod," "tripos" and "trivet" each means a "three-foot"; "trefoil" is a "three-leaf" and "triangle" a figure with three angles. "Treble" is a part in music, from *triplex*, "three-fold." "Trivial" comes from the *trivium* or "three ways" of mediæval learning as distinguished from the more advanced *quadrivium*. "Tribe" is the Latin *tribus*, one of the three divisions of the ancient Roman people; the "tribune" was the magistrate chosen by the plebeians to protect them from the oppression of the patricians; the "tribunal" the place from which he administered justice; and to the same word may be ascribed the derivatives "tribute," "tributary," "attribute" and "distribute." In a manner similar to *tribus* a Yorkshire "riding" was originally a "thrithing" or "thridding" (Old Norse *thrithjungr*) denoting a division into three parts. The month of May is said to have been known as *trimilki* amongst the Saxon ancestors of the English people from the fact that cows in that month were milked three

⁶¹ In Justinian's Digest (l. xvi. 242, §3) the Jurist Javolenus is cited as giving a curious (but erroneous) etymology of the word *vidua*, "a widow." As *vesanus*, he says, is a person *sine sanitate* and *vecors* a person *sine corde*, so *vidua* is a person *sine duitate*. The real meaning of the word is "without a husband" (Sanskrit *vi dhava*). As regards the prefix *ve-* it has been suggested that it was originally *dve-*. (See Pott, *Die Quinare und Vigesimale Zählmethode*, pp. 162 in *notis* and p. 195. See also footnote 44 to ¶60 above.)

times a day. The material called "drilling" is said to be the Latin *trilix*, made of three threads. To "thryfallow" or "treefallow" is to plough a third time before sowing. In the words "testify," "testimony," "testament" and "attest" it is possible that there may also lurk the numeral-word under discussion, for the Latin word *testis*, from which these words are derived, is supposed, with some show of reason, to be but a developed form of *tri-stis*, a person who as a third stands by in a matter in which two other parties are concerned. In an Oscan inscription we find the word *triestaamentud*, Latin *testamento*, Old Latin *testamentod*. From the Latin ordinal we have through the French, "tierce" "tiercel" and "tiercet." From the Greek we have, amongst other words, "trilobite" and "trisyllabic." From the Latin words for 3 and 1 together we get "triune."

¶88. From the Latin word denoting "fourth" the English language has derived such words as "quart," "quartan," "quarter," "quartern," "head-quarters," "quarter-day," "quarter-deck," "quartermaster," "quarterstaff," "quarter-sessions," "quarto," "quartette" and "quatrain." From the Latin form *quadrus* we have "quarry" the place where stones were "squared," besides a number of other words, such as "quadrant," "quadroon," "quadrille," "quadruped," "quadrangle" and "quad." From it also has been formed the verb *exquadrare*, whence we have the English "square," "squadron" and "squad." The Biblical word "foursquare" is thus tautological. In Italy, it appears, they now speak of a *squadrilla* of aeroplanes. From the form *quaterni* we have "quaternian" and "quaternary." In "quarantine" we have, through the medium of the French language, an allusion to the forty days during which a ship on arriving in port and suspected of being infected with disease is required

to forgo all intercourse with the shore. From the Greek word for 4 we have, through the Latin, derived the word "tesselated," referring to designs formed from little squares. The word "tetrarch," also of Greek origin, denoted the ruler of a fourth part of a province; a "tetragon" is a figure having four sides. "Farthing," the Anglo-Saxon *feorthing* or *feorthling*, is a coin equivalent in value to one-fourth of a penny, and "farthingdeal" or "fardingdeal" (whence the surname Farndell or Fardell) is one-fourth part of an acre. (Compare Dutch *vierendeel*, a fourth part). A shorter word is "farle" (*feorth dael*) the name given to a small cake or biscuit. "Firkin" is a diminutive form of the numeral-word for 4 and denotes that four of it go to a barrel. "Firiot" is a dry measure in use in Scotland, four of which measures make a "boll."

¶89. The word "punch" is said to be derived from the Hindu *pantsh* (Sanskrit *pañca*) meaning 5, because this drink was originally composed of five ingredients; much in the same way as from *dodrans* (9 *unciæ*) there was derived the name of a drink mentioned by the Roman writer Ausonius and consisting of nine ingredients, called *dodra*. In the word "quintessence" we have the *quinta essentia* of the alchemists, the fifth or last and highest essence or power in a natural body; hence an extract from such a body containing all its virtues in a concentrated form. "Quintain" again is a fever of which the paroxysms occur every fifth day. The "pentateuch" consists of the first five books of the Old Testament. "Cinque-foil" comes from the French, meaning "five-leaf." The origin of the name of the game of "fives" is obvious. In "sextant" and "hexagon" respectively we find the Latin and the Greek word signifying "six." "September," "October," "November" and "December" serve as mementoes of the time when

the months thus named were respectively the seventh, eighth, ninth and tenth months of the year, "sennight" (seven night) and "fortnight" (fourteen night) of the time when the Germanic usage still prevailed in England of counting time by the lapse of nights and not of days.⁶² In "heptarchy" we have the Greek form of the numeral-word denoting 7. In "octave," "octopus," "octaroon," "octavo," "octagon" and the like we meet with the Latin and Greek forms of the word denoting 8. "Noon" is with us midday, but was formerly the ninth hour (*nona hora*) of the day or three o'clock; and "nones" is the time of prayer observed at that hour. From "ten" we get the last syllables of the numeral-words from thirteen to nineteen and from these again we get the expression "in the teens." A "dean" was originally a chief of ten; so also we have "deanery" and "decanal." In "tithe" we have to do with the tenth part of the produce of land; in "tithing" with the old Saxon district containing ten householders, each responsible for the behaviour of the rest. "Dicker," from the Latin *decuria*, is a quantity of ten. A "dime" is the tenth part (*decima*) of a dollar; to "decimate" is to execute every tenth man; the "decimal" system is founded upon the usage of counting with tens, in accordance with the number of fingers on the two hands together. "Decade" is an aggregate of ten. "Decimeter"

⁶²In this way the danger was avoided of creating confusion by counting in the first day as well as the last day of the period referred to, as the Romans were often in the habit of doing in similar calculations. In Dutch "this day week" is denoted by *heden over acht dagen* (to-day over eight days) but "this day fortnight" by *heden over veertien dagen* (to-day over fourteen days). It may perhaps be the case that the latter expression came into vogue at a later period than the former and that when it did come into vogue the liability to confusion of ideas had become less than when the former came into vogue.

and "decimeter" are derived from the Latin and Greek numeral-words for 10 respectively.

¶90. Proceeding to words which are derived from numeral-words expressing numbers over 10, in *duodenum*, a part of the intestines about twelve finger-breadths in length, we meet with the Latin word denoting 12; in "dozen" we meet with the same word in a French garb. "Pentecost" is the "fiftieth" day after the Passover. In "hecatomb" we have the Greek and in "cent," "century" and "centurion" the Latin form of the numeral-word signifying 100. A "hundred," as a division of a county, is supposed originally to have comprised a hundred heads of families; and a "hundredor" is anyone living within such a division and liable to serve on a jury thereof. "Septuagint" reminds us of the official recognition of the Greek translation of the pentateuch by the seventy members of the Jewish Sanhedrim at Alexandria some three hundred years before Christ. "Septuagesima" is the seventieth day before Easter. "Kilogram," "kilometre" and the like are from the Greek word for 1,000. We come across the Latin word meaning 1,000, *mille*, in "mile," meaning originally a thousand paces, in "millennium," a period of a thousand years, in "million" a thousand thousands, and in "millionaire" the possessor of such thousands in pounds sterling. The millionaire could not have made his money without the use of the numeral-words; in more senses than one the numeral-word has made the millionaire. The Greek language gives us, moreover, "myriad" from the word denoting 10,000 in that language.

¶91. From the words expressing fractions the English language has also received a number of new words. From "half" for instance it has "behalf" (in the case of which, however, the word

“ half ” has the more original meaning of “ side ”), “ half-way,” “ half-brother ” and “ half-sister,” “ halfpenny ” and the verb to “ halve.” From the Greek *hēmi* it has similarly received “ hemisphere ”; from the Latin *dimidium* it has in part acquired “ demi-god ” (a curious combination of a Latin with an English word) whilst *semi-* takes its place in “ semicircle ” and “ semicolon ”; with the assistance of Greek and Latin together there has been created “ hemi-demi-semi-quaver.” The Latin *uncia*, by the way, has furnished the English language with both “ inch ” and “ ounce ”; besides such words as “ inchmeal,” “ ouncebore,” and the adjective applied to letters of the alphabet of a certain size, “ uncial.”

CHAPTER X

CONCLUSION

¶92. WE have endeavoured in these pages to trace the art of counting back to a period when our early forefathers probably did not count beyond the first two or three fingers of one hand. That period was so far back that it is impossible at the present day to say with certainty what was the meaning of the words which express the first three numerals. We have seen an advance thence to a period when the fingers of one hand being counted the number obtained was described as the "whole hand" and the number 4 probably as the "whole hand less one." The number 10 was then described as "two hands," and in succession names for the other numerals were acquired.

¶93. The numeral-words invented by man were, with the exception of the few lowest, cumbrous in form, but thereafter they underwent a process of simplification, and, when their form was once fixed they maintained their position in language better than most other words. By means of these invented words that practice of bartering came into existence that, with the aid of the numeral-figures, after the invention of a system of weights and measures, developed into the mighty trade and commerce of the present day. And with the assistance of these words science has become a magnificent factor of common life.

¶94. The aptitude and inventiveness of man in framing new words to express new ideas, or to express old ideas more suitably than by means of the words which he had in use before, has been illustrated by the way in which words of the most diversified meanings have been formed from the numeral-words. Whilst, for instance, of such new words "duelling" and "bellicosity" show some of the evil features of his nature, "atonement" and "unity" point to something better. And as man's stock of knowledge increases, so does the list of words ready to his use increase—many of them derived from the numeral-words.

¶95. If any important lesson is to be learned through the study of the numeral-words it is this, that these words were not conferred as a gift upon man, but that he invented them. Looking back at the present day along the course of past millennia into that distant period when, as all indications seem to show, rude man first feebly learned to distinguish and to denote number, all that we know points to the fact that the history of the science and practice of mathematics has been a history of progress. No place is left for the supposition that man was originally created a civilised being. For it is not possible to conceive that he should originally have had a complete and civilised language, with words assigned to the expression of numerals and that he should have lost those expressive of the higher numerals and, as to the rest, abandoned these in favour of terms expressive of his action of counting upon his fingers. Much rather is it clear that he laboriously evolved a system of numeration from his counting in this manner and to this practice gave expression by means of such language as at the time he had at his command.

¶96. No perfect language thus was bestowed upon man; it was a thing of purely human invention

and was brought to such perfection as it can claim merely by human means. The earth was not created bearing in its bosom every fossil bone and shell as these now exist; on the contrary fossil bones and shells bear testimony to the fact of slow and gradual development; so the numeral-words, in common with other words, testify to this: that the language we now use has passed through a long period of progressive growth.







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